THE
Schoolmasters Assistant:
BEING A
Compendium of ARITHMETIC,
BOTH
Practical and Theoretical.

In·Five PARTS.

CONTAINING

I. Arithmetic in Whole Numbers, wherein all the common Rules, having each of them a sufficient Number of Questions, with their Answers, are methodically and briefly handled.

II. Vulgar Fractions, wherein several Things, not commonly met with, are there distinctly treated of, and laid down in the most plain and easy Manner.

III. Decimals, in which, among other Things, are considered the Extraction of Roots ; Interest, both Simple and Compound; Annuities, Rebate, and Equation of Payments.

IV. A large Collection of Questions, with their Answers, serving to exercise the foregoing Rules ; together with a few others, both pleasant and diverting.

V. Duodecimals, commonly called Cross Multiplication ; wherein that Sort of Arithmetic is thoroughly considered, and rendered very plain and easy ; together with the Method of proving all the foregoing Operations at once by Division of several Denominations, without reducing them to the lowest Term mentioned.

The Whole being delivered in the most familiar Way of *Question* and *Answer*, is recommended by several eminent *Mathematicians, Accomptants,* and *Schoolmasters,* as necessary to be used in *Schools* by all Teachers, who would have their *Scholars* thoroughly understand, and make a quick Progress in ARITHMETIC.

To which is prefixt, An ESSAY on the *Education* of YOUTH ; humbly offer'd to the Consideration of PARENTS.

The Sixteenth Edition.

By THOMAS DILWORTH,

Author of the *New Guide* to the *English* Tongue ; *Young Bookkeeper's Assistant; &c. &c.* and *Schoolmaster* in *Wapping.*

All Things, which from the very first Original Being of Things, have been framed and made, do appear to be framed by the Reason of Number ; for this was the principal Example or Pattern in the Mind of the CREATOR. Anitius Boetius.

Thou [O LORD] *hast ordered all Things in Measure, Number, and Weight.* Wisdom xi. 20.

LONDON:

THE
PREFACE Dedicatory.

To the Reverend and Worthy

SCHOOLMASTERS

IN

GREAT BRITAIN and IRELAND.

GENTLEMEN,

*A*FTER *returning You my most hearty Thanks for Your kind Acceptance of my* New Guide *to the English Tongue, permit me to lay before you the following* Pages, *which are intended as an* Help *towards a more speedy Improvement of your Scholars in* Numbers, *and at the same Time, to take off that heavy Burden of writing out* Rules *and* Questions, *which you have so long labour'd under.*

I need not, I presume, say any thing concerning the Usefulness of, and Advantages that accrue to Mankind in general from Arithmetic, *since they are, by this Time, pretty well known; and also deserve the Employment of a much better* Pen *than mine can pretend to be; but I will venture to say thus much, and I believe you will pardon me for it, that* THIS *(by putting one into each* Arithmetician's *Hand) will not only prove a kind* ASSISTANT *to You, but upon Trial, be found at once, both to delight and improve the Minds of those, who are committed to your Care.*

A 2 *I have*

I have gone through all the Parts of Arithmetic, *commonly taught in* Schools, *and have included several others no less useful: And though I have given more* Questions *to work upon in each* Rule *(which was absolutely necessary; none having yet calculated their* Performances, *of this* Kind, *for the Use of* School Boys) *I have endeavoured at the same time to reduce the* Whole, *to as neat and portable a* Volume, *as any that have gone before me.*

I must confess, I do not propose by THIS, *to add to any* Master's *Knowledge in* Arithmetic, *who, I imagin, is already acquainted with every thing contained in this* Compendium; *for which Reason it is reduced to the narrow Compass it now appears in, without particular* Directions *for working the* Operations *at large; and therefore, I conceive, here is room enough left for every* Man *to speak his own Mind, and instruct his* Pupils *in his own* Method. *And,*

I believe, it is confessed by All, *that it is a* Task *too hard for* Children *to be made compleat* Masters *of* Arithmetic; *and therefore the best* Way *of instructing them in it is, most certaiuly, first to give them a general Notion of it, in the easiest Manner, and next to enlarge upon it afterwards, if there be* Time; *otherwise it must be done by themselves, as their Increase in* Years *and Growth in* Understanding *will permit.* * " For *Arithmetic* is the " more valuable, as it is the more *exact, easy* and *short*; " and the *Art* lies in giving as few *Rules* as possible, and " clearly explaining them; and not confounding *Prin-* " *ciples* together, and then diversifying them into several " *Rules*, when they are built on the same *Reason*, " which has not only made *Arithmetic* seem difficult of " *Access*, but has hinder'd many from being *Accompt-* " *ants*."

To enter into a Detail *of the following* Particulars, *would be tedious, and swell this* Preface *beyond its just* Limits; *but that the* kind Reader *may not be wholly at a* Loss, *I shall beg Leave to speak as follows, viz.*

1. *That the* Whole *is divided into* Five Parts, *as the* Title-Page *expresses it.*

2. *That*

* WATTS's Essay.

2. *That the* Rules *and* Examples *are contrived in the plainest Manner, and the* Whole *put in such an easy Method, as is no where else extant.*

3. *I have omitted* Reduction *of* Foreign Coins, *partly because all those* Tables, *which I have met with, which shew the Value of* Foreign Coins *in* English Mony, *are very erroneous, but principally because all such* Questions *as relate to the turning of the* Mony *of one* Country *into that of another, are much better answered under the* Head *of* Exchange. *For the* Value *of* Foreign Species *(such I mean as relate only to* Exchange*) both of* Gold *and* Silver, *in every* Country *is unsettled, and therefore such* Coins *are subject to vary in their* Prices, *as the* Merchants *find an Opportunity to profit by them. Hence proceed the various* Courses *of* Exchange; *and from them again, the particular* Worth *of any* Quantity *of* Foreign Coin *in* English Mony, *which is sometimes* more, *sometimes* less, *according as the* Course *of* Exchange *runs at that Time when such* Foreign Coin *becomes due. Add to this the* Agio *or* Advance Mony, *usually paid* Abroad *on the changing* Current Mony *into* Exchange *or* Bank-Mony, *which is* 2, 3, *or more* per Cent. *in* Payment, *according to what the* Exchange *or* Bank-Mony *is worth more than the* Current Mony, *and this cannot be done otherwise than by the* Rule *of* Three.

4. *In* Interest, &c. *by* Decimals, *I have follow'd Mr.* WARD's *Method, by which Means the* Rule *is drawn into a much narrower Compass; and appears more beautiful to the Eye than in Words at Length.*

5. *In all Places where it could be done conveniently,* I *have given Directions for varying the* Examples *by Way of* Proof; *because it not only discovers the Reason of the* Operation, *but at the same Time both produces a new* Question, *and proves the old One. And sure I am, that the varying the* Question, *when it may be done under the same* Rule, *contributes very much towards a thorough Understanding of it, and making a* good Accomptant, *as every one's Experience will teach him.*

6. *I have thrown the Subject of the following Pages into a* Catechetical Form, *that they may be the more instructive;*

ſtructive; for Children *can better judge of the Force of an* Anſwer, *than follow* Reaſon *thro' a Chain of* Conſe- quences. *Hence alſo it proves a very good* examining Book; *for at any Time, in what Place ſoever the* Scholar *appears to be defective, he can immediately be put back to that* Place *again, without the formal Way of beginning every Thing anew.*

7. *In order to make the* Progreſs *ſtill quicker, every* Example, *to be wrought, hath its* Anſwer *annexed to it : So that they who do not chuſe to have every* Operation *proved by varying the* Queſtion, *may know without it, whether the* Work *be right or not.*

8. *Concerning* Contractions *in Numbers, which ſome are very fond of, I have ſaid very little, and my Reaſon is this;* Contractions *are no farther valuable than they are uſeful; hence, if in order to leſſen the Number of Figures in an Operation, there is not only more Time ſpent than in the ordinary Way, but thoſe* Contractions *are alſo more liable to Error, ſuch* Contractions *ought to be rejected.*

And now, after all, it is poſſible that ſome, who like beſt to tread the old beaten Path, *and to ſweat at their* Buſi- neſs *when they may do it with* Pleaſure, *may ſtart an Ob- jection againſt the Uſe of this* well-intended Aſſiſtant; *becauſe the Courſe of* Arithmetic *is always the ſame; and therefore ſay,* ' that ſome Boys lazily inclined, when they ' ſee another at work upon the ſame Queſtion, will be ' apt to make his Operation paſs for their own : *But theſe* little Forgeries *are ſoon detected by the Diligence of the* Tutor : *Therefore, as* different Queſtions *to* different Boys, *do not in the leaſt promote their* Improvement : *So neither do the ſame* Queſtions *hinder it. Neither is it in the Power of any* Maſter *(in the Courſe of his* Buſineſs) *how full of Spirits ſoever he be, to frame* New Queſtions *at Pleaſure in any* Rule, *but the ſame* Queſtions *will fre- quently occur in the ſame* Rule, *notwithſtanding his great- eſt* Care *and* Skill *to the contrary.*

It may alſo be further objected, ' That to teach by a ' printed Book, is an Argument of Ignorance and In- ' capacity,' *which is no leſs trifling than the former. He indeed (if any ſuch there be) who is afraid his* Scholars *will*

*will improve too fast, will undoubtedly decry this Method;
But that Master's Ignorance can never be brought in que-
stion, who can begin and end it readily; and most certainly
that* Scholar's Non-Improvement *can be as little que-
stioned, who makes a much greater* Progress *by* This, *than
he possibly can by the* common Method.

As to the Order *of the* Rules, *I can hardly find* two
Masters *follow it alike; some liking best to teach that* Rule
*first, which another thinks more convenient to teach after-
ward; while a third looks upon it as a Matter quite in-
different, among* some Rules, *which he teaches first. But
this need be no* Hindrance *to the Use of this* Book. *For
however the* Rules *are placed here, every Man may turn
to that* Rule *first, which he likes should be taught first;
and if a* Master *has a Mind to teach* Vu'gar Fractions
immediately after Reduction *of* Whole Numbers, *as some
do, he may do it as easily, as in the Order they now lie.*

To the eleventh Edition, *and which is continued in this,
I have added* Duodecimals, *commonly called* Cross Mul-
tiplication; *wherein I have largely treated of that sort of*
Arithmetic, *in every Branch; shewing how the same may
be proved by varying the* Operations; *by whole* Numbers;
by vulgar Fractions, *and by* Decimals; *and lastly by a
particular sort of* Division, *wherein the* Divisor, Dividend
and Quotient *are, each of them, of several Denominations,
just as the* Factors *and* Products *are in* Multiplication,
*without reducing them into the lowest Term or Denomina-
tion mentioned. And as* Duodecimals, *by all the Writers
that I have seen, except Mr.* Hawney, *have only been su-
perficially treated of, I think I may venture to say, without
any Breach of Modesty, that this is the compleatest Piece
of that kind extant.*

As a further Improvement of this Compendium, *I have
considerably enlarged the* Rule *of* Exchange, *and among
others, have given a Variety of Examples of real Bills of*
Exchange, *to be wrought by the Pupil, in order to shew
him, in a more particular manner, the Necessity of know-
ing how to turn the Mony of one Country into the Mony of
another* Country, Value *for* Value, *where the Merchant
happens to be engaged in foreign Trade. I have also taken*

A 4   *the*

the Liberty to put the Double Rule of Three after Exchange, which in most of the former Editions stood before it, to the End that all the Mercantile Rules in whole Numbers might stand together; and likewise, that the Pupil might, at the End of Exchange, enter upon a Course of Book-keeping, if there should not be Time for him to go through the whole Compendium first.

I should have been very glad to have seen an Attempt of this Nature, stampt by the Authority of some Person of Distinction and of better Abilities; but since no abler Hand has undertaken it, I hope its homely Appearance will not lessen its Usefulness.

The Printer's Errors, as well as my own Defects, I hope will candidly be overlook'd: But because a Man's Failings are so familiar to himself, that he can scarce discern them; therefore the kind Admonitions of a good natur'd Reader, shall always be very acceptable.

I have nothing more to add, but my repeated Thanks for Favours received, together with my earnest Desire that you may be prosperous in Your several Undertakings, and to beg this additional Favour of being esteemed,

GENTLEMEN,

Your most humble, and

most obedient Servant,

THOMAS DILWORTH.

ON

ON THE

Education of YOUTH

AN

ESSAY;

Humbly offer'd to the Confideration of

PARENTS.

HE right Education *of* Children, *is a Thing of the higheft Importance, both to* Themfelves and the Common-wealth. *It is* this, *which is the natural Means of preferving* Religion and Virtue *in the World* : *And the earlier* good Inftructions *are given, the more lafting will be their Impreffion. For it is as unnatural to* deny *thefe to* Children, *as it would be to with-hold from them their neceffary Subfiftance. And happy are thofe, who, by a* religious Education *and* watchful Care *of their* Parents, *their wife* Precepts *and* good Examples, *have contracted fuch a Love of* Virtue *and Hatred of* Vice, *as to be removed out of the Way of* Temptations. *And 'tis owing to the Want of* this Educa- *tion, that many, when they leave their* Schools, *do not prove fo well qualified as might be expected. This great* Omiffion *being, for the moft part, chargeable on the* Parents, *I hope the following Particulars (which are the common Voice of our Profeffion) will not be taken amifs.* And

1. *A constant* Attendance *at* School *is one main Axis whereon the great* Wheel *of* Education *turns. Therefore if that Obfervation, which is commonly made by* Parents *be*

A 5   *true,*

true, That the Masters have Holidays enough of their own making, *there is, by their own Confession, no Necessity for them to make an Addition.*

2. Parents *should never let their own Commands run counter to the* Master's, *but whatever* Task *he imposes on his* Pupils, *to be done at Home, they should be careful to have it perform'd in the best Manner, in order to keep them out of* Idleness. * " For vacant Hours move on heavily, and " drag *Rust* and *Filth* along with them; and 'tis full " Employment, and a close Application to Business, that " is the only Barrier to keep out the Enemy, and save " the *future Man.*

3. Parents *themselves should endeavour to be sensible of their* Childrens Defects *and want of* Parts; *and not blame the* Master *for* Neglect, *when his greatest Skill, with some, will produce but a small Share of* Improvement. *But the great Misfortune is, as the* Proverb *expresses it*; Every Bird thinks her own Young the fairest : *And the tender* Mother, *tho' her Son be of an ungovernable Temper, will not scruple to say,* He is a meek Child, *and will do more with a Word than a Blow, when neither* Words *nor* Blows *are available.* On the other Hand, *some* Children *are of a very dull and heavy* Disposition ; *and are a long Time in gathering but a little Learning, and yet their* Parents *think them as capable of* Instruction, *as those, who have the most bright and promising* Parts : *And when it happens that they improve but slowly, tho' it be in Proportion to their own* Abilities, *they are hurried about from* School *to* School, *till at last they lose that Share of Learning, which otherwise by staying at the same* School, *they might have been* Masters of. *Just like a sick, but impatient* Man, *who employs a* Physician *to cure him of his* Malady ; *and then, because the* Distemper *requires* Time, *as well as* Skill, *to procure his* Health, *tells him,* ' He has ' all along taken a wrong Method;' *turns him off, and then applys to another, whom he serves in the same Manner ; and so proceeds till the* Distemper *proves incurable.*

4. It

* WATTS's Essay.

4. *It is highly necessary that* Children *should be early made sensible of the Scandal of telling a* Lye: *To this End* Parents *must inculcate upon them, betimes that most necessary* Virtue *of speaking* Truth, *as one of the best and strongest Bands of* Human Society *and* Commerce, *and the Foundation of all* Moral Honesty.

5. Injustice *(I mean the tricking each other in Trifles, which so frequently happens among* Children, *and is very often countenanced by the* Parents, *and looked on as the Sign of a very* promising Genius) *ought to be discouraged betimes, lest it should betray them into that vile Sin of* pilfering *and* purloining *in their riper Years; to which the grand Enemy of* Mankind *is not wanting to prompt them by his Suggestions, whenever he finds their Inclinations have a Tendency that Way.*

6. Immoderate Anger *and Desire of* Revenge, *must never be suffered to take Root in* Children. *For (as a most Reverend* Divine *observes)* * " If any of these be " cherished, or even let alone in them, they will, in " a short Time, grow headstrong and unruly; and when " they come to be Men, will corrupt the Judgment, " turn good Nature into Humour, and Understanding " into Prejudice and Wilfulness.

7. Children *are very apt to say at* Home *what they see and hear at* School, *and oftentimes more than is true; and some* Parents, *as often, are weak enough to believe it. Hence arise those great Uneasinesses between the* Parents *and the* Master, *which sometimes are carried so high, as for the* Parent, *in the Presence of the* Child, *to reproach him with hard Names, and perhaps with more abuseful* Language. *On the Contrary,*

8. *If* Parents *would have their* Children *improve in their* Learning, *they must cause them to submit to the little (imaginary) Hardships of the* School, *and support them*

* A. B. TILLOTSON.

them under them by suitable Encouragements. *They should not fall out with the* Master *upon every* idle Tale, *nor even give their* Children *the Liberty of expressing themselves that way; but they should, by all Means, inform them frequently,* 'That they ought to be good Boys, 'and learn their Book, and always do as their Master 'bids them, and that if they do not, they must undergo 'the Pain of Correction.' *And it is very observable what a Harmony there is between the* Master *and the* Scholar, *when the latter is taught to love and have a good Opinion of the former; and then* With what Ease does the Scholar learn! With what Pleasure does the Master communicate!

9. *The last Thing that I shall take Notice of is, That while the* Master *endeavours to keep* Peace, *good* Harmony, *and* Friendship *among his* Scholars, *they are generally taught the* Reverse *at* Home. * "It is indeed but too common "for *Children* to encourage one another, and be encou- "raged by their *Friends* in that Savage and Brutal Way "of *Contention*, and to count it a hopeful Sign of *Mettle* "in them to give the *last Blow*, if not the *first*, where- "ever they are provoked; forgetting at the same Time, "that to teach *Children* betimes to love and be good na- "tured to others, is to lay early the true Foundation of "an *honest Man*. Add to this, that *cruel Delight* which "some are seen to take in tormenting and worrying such "poor *Animals* and *Insects* as have the Misfortune to fall "into their Hands. But *Children* should not only be "restrained from such *barbarous Diversions*, but should "be bred up from the Beginning to an Abhorrence of "them," and at the same Time be taught that great Rule of Humanity, *To do to others as we would they should do to us.*

From what has been said relating to the Management of Children *at* Home, *the Necessity of the* Parents *joining* Hands *with the* Schoolmaster *appears very evidently. For*
                                                                when

* Talbot's Christian Schoolmaster.

when the Master *cammands his* Pupils *to employ their* leisure Time *in getting some necessary Parts of* Learning, *their Friends should not command them to forbear : And when they ought to be at* School *at the stated Hours, they should not be sent an Hour or two after, in the Time of* Health, *sometimes with a* Lye *in their* Lips *to excuse their* Tardiness ; *and sometimes, with an* Order, *and a brazen* Front, *to tell their* Master, Their Friends think it Time enough to come to School at Nine in the Morning, because the Weather is a little Cold, or because they must have their Breakfast first. *I say* Parents *should not act so indiscreetly, because it clips the Wings of the* Master's *Authority : It makes* Boys *first despise, and undervalue their* Teachers, *and then become unmannerly and impertinent to them ; Correction for which, makes the Tutor hated by the* Children, *and then there naturally follows either a total disregard to* Business, *or a* general Carelessness *in every Thing they do. And*

While I am speaking of the Education of Children, *I hope I shall be forgiven, if I drop a Word or two relating to the* fair Sex.—*It is a general* Remark *that they are so unhappy as seldom to be found either to* Spell, Write, *or* Cypher *well : And the Reason is very obvious ; Because they do not stay at their* Writing Schools *long enough. A Year's Education in* Writing *is, by many, thought enough for* Girls ; *and by others it is thought Time enough to put them to it, when they are* Eighteen *or* Twenty Years *of* Age ; *whereas by sad* Experience, *both these are found to be, the one too short a Time, and the other too late. The first is a Time too short, because, when they are taken from the* Writing School, *they generally forget what they learnt, for want of* Practice : *And the other too late, because then they are apt to look too forward, imagin all things will come of themselves without any Trouble, and think they can learn a great deal in a little Time ; and when they find they cannot compass their Ends so soon as they would, then every little* Difficulty *discourages them : And hence it is that* adult Persons, *seldom improve in the first*

Principles

Principles *of* Learning *so fast as younger Ones. For a Proof of this, I appeal to every* Woman, *whether I am just in my* Sentiments *or not. The* Woman *who has had a liberal* Education *this Way, knows the* Advantages *that arise from the ready Use of the* Pen; *ana the* Woman *who has learnt little or nothing of it, cannot but lament the* Want *of it.* Girls *therefore ought to be put to the* Writing-School *as early as* Boys, *and continued in it as long, and then it may reasonably be expected that both* Sexes *should be alike ready at their* Pen. *But for want of this, How often do we see* Women, *when they are left to shift for themselves in the melancholy* State *of* Widowhood *(and what* Woman *knows that she shall not be left in the like* State *?) obliged to leave their* Business *to the Management of others; sometimes to their great* Loss, *and sometimes to their utter* Ruin; *when on the contrary had they been ready at their* Pen, *could* Spell *well, and understand* Figures, *they might not only have saved themselves from* Ruin, *but perhaps have been* Mistresses *of good* Fortunes. *Hence then may be drawn the following, but most* natural Conclusion, *viz.* * " The Education of
" Youth is of such vast Importance, and of such singular
" Use in the Scene of Life, that it visibly carries its own
" Recommendation along with it: For on it, in a great
" Measure, depends all that we hope to be; every Per-
" fection that a generous and well-disposed Mind would
" gladly arrive at: 'Tis this that stamps the Distinction
" of Mankind, and renders one Man preferable to ano-
" ther: Is almost the very Capacity of doing well; and
" remarkably adorns every Point of Life." And as the
great End of human Learning is to teach a Man to know
himself, and thereby fit him for the Kingdom of Hea-
ven: So he that knows most, consequently is enabled to
practice the best, and become an Example to those who
know but little, or are quite ignorant of their Duty. I
am,

Your and your Children's Well-wisher,

THOMAS DILWORTH

* WATTS's Essay.

To Mr. THOMAS DILWORTH,

ON HIS

Compendium of ARITHMETIC,

INTITLED,

The *Schoolmasters Assistant.*

WHILE some, seducive of the rising Age,
    Expose for Hire the lewd and factious Page,
On every Stall appear the public Pest,
Deep Bane instilling in the tender Breast ;
Thou, Friend of moral as of social Truth !
Employ'st thy Toils to mend our growing Youth.
Thy Cares, how worthy of the Good and Wise,
Impow'r the Embrio Genius first to rise ;
Make the dark Clues of Science plain to find,
And thro' its Mazes lead the pleasur'd Mind.
E'en now afresh, unweary'd in thy Pains,
For future Times thy recent Task remains :
By double Motives it assures to please,
The Youth's Instructor, and the Tutor's Ease :
From darker Forms it clears encumber'd Rules,
And Learning makes the fit Delight of Schools.
    Thy Labours, Friend, have found their just Success,
And gen'ral Plaudits thy Desert confess.
O may THIS WORK, nor THIS be found thy last,
No sordid Pride o'erlook, or Envy blast,
Far as our Mother-Tongue extends be known,
And grateful Pupils thy Assistance own.

MOSES BROWNE.

To Mr. Thomas Dilworth,

ON HIS

Schoolmasters Assistant.

DILWORTH, the Man by gracious Heav'n defign'd,
  A Friend, a Father, to the Human Kind;
Whofe active Diligence and warmer Zeal
United, Center in the Public Weal!
Fain wou'd my Mufe difcharge the Debt of Praife,
With frefh Additions to thy circling Bays.
  LEARNING, the Glory of *Britannia*'s Ifle,
Within thy fav'rite Leaves is taught to fmile;
No more perplex'd in Error's Maze we run,
And meet the Danger, which we fought to fhun;
Since, drawn by thee, now fhines before our Eyes,
The Path where Virtue and fair Knowledge lies:
There waits a * Guide, by niceft Model plann'd,
Here ftands an Ufher with affifting Hand;
A Work fo clear, delighted we purfue,
And think the pleafing Profpect ever new.
  So the kind Sun, with all reviving Ray,
Clears the dark World with an approaching Day:
Before his Light the empty Shadows fly,
And Nature glows with a ferener Sky.

<div align="right">

WILLIAM DEANE.

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* Referring to that of the *Englifh Tongue.*

Halifax, Oct. 20, 1765.

To Mr. Thomas Dilworth, *Author of The* Schoolmasters Assistant.

SIR,

AS you was pleased to favour me with the Perusal of Your *Schoolmasters Assistant* in Manuscript, which gave me a sensible Pleasure; You have thereby obliged me, in Justice to your Merit, to give my humble Opinion upon it.— That a Work of *this Kind* has been long wanted, admits of no Dispute: And I must confess, that you have treated the Subject so methodically, laid down the several Rules so very plain, yet concise, as must make this Book of general Use and Advantage: And I heartily wish you may meet with equal Encouragement in the Publication of this, as you did in your excellent *New Guide* to the *English Tongue.* I am, SIR,

London, 29th of
Novembr,
1743.

Your sincere Friend,

And humble Servant,

BRIGHT WHILTON.

To Mr. Thomas Dilworth, *on his* Schoolmasters Assistant.

SIR,

I Have perused, with Pleasure, Your *Schoolmasters Assistant,* and give You my Thanks for your kind Endeavours to further the Improvement of Youth with greater Facility to the Tutor.

I am convinced, *that Piece* is well calculated to promote both, and therefore wish you the Success due to so much useful Labour. I am,

SIR,

Twelve-Bell-Court
in *Bow Church-
Yard,* 13 *Jan.*
1743.

Your Friend and Servant,

WILLIAM COLES.

To Mr. Thomas Dilworth, *on his Treatise of* ARITHMETIC, *intitled,* The Schoolmasters Assistant.

SIR,

IT is universally allow'd (in all Nations civiliz'd) that the Instruction of Youth is of the greatest Importance, the Happiness of every Individual, and Society in general thereon depending; and that it is of two Kinds, *viz.* To form the good Man and the good Scholar. To compleat the latter, those Studies are chiefly to be pursu'd, which are adequate to the Disposition of the Pupil, and to compleat the Man of Business he is design'd for: But I do not know any Business that can be well executed without ARITHMETIC. THIS therefore claims the first Place, and due Care of the Master, to inculcate and explain its Rudiments, which will not only ground the *Tyro*, but also give him some Glances of those Beauties and Uses, he may expect from his present Labours: Every Help then, that may gain the Master Time in the Discharge of his Duty, will (in consequence) add to the Improvement of his Scholars: For which Use and Purpose, that THIS BOOK is well adapted, (having perus'd it some Time ago in Manuscript) is the ingenuous Opinion of, SIR,

Gainford-street, Shad-Thames, Southwark, the 9th of *May*, 1743.

Your respectful Friend and Servant,

WILLIAM MOUNTAINE.

To Mr. Thomas Dilworth, *Author of the* Schoolmasters Assistant.

SIR,

I Have perus'd your *Book*, intitled, The *Schoolmasters Assistant*, and readily recommend it as a *proper Companion*, for such as are employ'd in teaching ARITHMETIC, as well as for those who are desirous of Improvement in that useful and necessary SCIENCE. I am,

SIR,

The Academy in Little Tower-street, 29 *March*, 1744.

Your humble Servant,

EM. AUSTIN.

WE whose Names are underwritten, having perused this Book, intitled, The SCHOOLMASTERS ASSISTANT, do recommend it to be used in Schools, for the speedy Improvement of YOUTH in ARITHMETIC, as the only one for that Purpose, that hath yet been made public.

Charles Bellenger, *M. A. Lecturer of* Trinity, Minories, *and Master of the Free-School belonging to the Worshipful Company of Brewers,* London.

James Dalton, *M. A. Master of the Boarding-School at* Stanmore, *in* Middlesex.

The Rev. Mr. Joseph Willson, *Master of the Free-School at* Nether Kebworth, *in* Leicestershire.

The Rev. Mr. Richard Willson, *Master of the Free-School at* Rutterworth, *in* Leicestershire.

The Rev. Mr. Robert Willson, *Master of the Free-School at* Warbleton, *in* Sussex.

Francis Chapman, *Writing-Master and Accomptant, in* Shadwel.

Francis Hopkins, *Writing-Master and Accomptant, in* Cavendish-Court, *near* Devonshire-Square.

John Loveday, *Schoolmaster, at* Stepney.

Ebenezar Bramble, *Master of a Boarding-School in* New-Brentford.

William Mercer, *Writing-Master at* Maidstone.

William Tully, *Master of the Boarding-School at* Stanmore, *in* Middlesex.

John Thorpe, *Writing-Master and Accomptant, at* St. Edmund's Bury, Suffolk.

Thomas Evans, *Schoolmaster, at* Hampstead.

Richard Astell, *Writing-Master at* Epsom.

Robert Pierson, *Schoolmaster in* Redcross-Street.

John Richardson, *Schoolmaster by* London-Wall.

George Watts, *Schoolmaster in* Penny-Fields, Poplar.

Augustine Gradwell, *Master of Mr.* Worral's *Free-School, in* Cherry-Tree-Alley, Golden-Lane, St. Luke's.

John Tuckett, *Writing-Master and Teacher of the Mathematics, at the* Hand *and* Pen *and* Globe *in* New-street, *near* Fleet-street.

George Caffey, *Schoolmaster in* Whitechapel.

Edward Rayne, *Master of the Haberdashers School at* Hoxton.

John Shortland, *Schoolmaster in* St. Ann's Lane, *near* Aldersgate.

Francis Cartwright, *Schoolmaster, near* Shoreditch-Church.

William Paulson, *Schoolmaster in* Norton-Falgate.

Jeremiah Walker, *Writing-Master and Accomptant, in* Old Gravel-Lane, *near* Ratcliff Highway.

Henry Mason, *Schoolmaster at* St. George's Church, Southwark.   Henry

Henry Longman, *Schoolmaster in* Fitcher's Court, Noble-street, *near* Cripplegate.

John Day, *Writing-Master and Accomptant, at* Doctors-Commons.

Thomas Young, *Schoolmaster in* St. Margaret's, Westminster.

John Davis, *Teacher of the Mathematics, in* Old Paradise-street, Rotherhithe.

Joseph Miller, *Schoolmaster, in* Street-lane, *near* Huthersfield, Yorkshire.

John Parsons, *Writing-Master and Accomptant, in* Penny-Fields, Poplar.

Erasmus Carter, *Schoolmaster, at* Newington.

Henry Michon, *Schoolmaster, in* Red Lion-Market, *near* Golden-lane.

John Wingfield, *Schoolmaster in* Bull *and* Mouth-street, *near* Aldersgate.

Joseph Allen, *Schoolmaster and Accomptant, in* White-cross-street.

Joseph Beasing, *Writing-Master and Accomptant, at* Cheshunt *in* Hertfordshire.

John Canton, *M. A. Master of the Academy in* Spital-square.

Joseph Winder, *Master of the Grammar-School in* Coleman-street.

Charles Delafosse, *Master of a Boarding-School at* Richmond, Surry.

Daniel Kitchen, *Schoolmaster at* Bishop-Burton, *near* Beverley, *in* Yorkshire.

Robert Sawell, *Master of the Boarding-School, at* Aspley, *near* Woborn, Bedfordshire.

Charles Morton, *Teacher of the Mathematics, in the Rectory-House of St.* Leonard, Shoreditch.

Samuel Godier, *Teacher of the Classics, near the Church,* Spital-Fields.

Robert Smith, *Writing-Master and Accomptant, at* Richmond, Surry.

William Shemeld, *Writing-Master and Accomptant at* Hampstead *in* Middlesex.

Dennis Metherington, *Schoolmaster at* Marston *in* Lincolnshire.

Robert Amos, *Writing-Master and Accomptant in* Ratcliff-highway, St. George's, Middlesex.

Henry Andrews, *Philomath. Schoolmaster, at* Stilton *in* Huntingdonshire.

Abraham Crocker, *Schoolmaster at* South Petherton, Somerset.

Nathaniel Wurteen, *Schoolmaster at* Philadelphia.

John Bredel, *Teacher of the* French *and* English *Languages, in* Spital-Fields.

The TABLE of CONTENTS.

PART I.

Of WHOLE NUMBERS.

PART II.

Of VULGAR FRACTIONS.

PART

The TABLE, &c.
PART III.
Of DECIMAL FRACTIONS.

The Explication of *some* Marks *used* in this COMPENDIUM.

= TWO Parallel Lines are the Marks of *Equality*; as, 12 *oz.* $=$ 1 *lb.* fignifies that 12 Ounces are *equal* to 1 Pound.

+ Saint *George*'s Crofs fignifies *more*, or *Addition*; as, 4 $+$ 2 $=$ 6 : *i. e.* 4 *more* 2, are *equal* to 6.

— A ftraight Line fignifies *lefs*, or *Subtraction*; as, 4 $—$ 2 $=$ 2 : *i. e.* 4 *lefs* 2, are *equal* to 2.

× Saint *Andrew*'s Crofs denotes *Multiplication*; as, 4 $×$ 2 $=$ 8 ; *i. e.* 4 *multiplied* by 2, are *equal* to 8.

÷ ∴ A Line between two Points, or between 4 Points, is the Sign of *Divifion*; as, 4 $÷$ 2 or 4 $∴$ 2 $=$ 2 : *i. e.* 4 *divided* by 2, are *equal* to 2.

)(The reverfed Parenthefis denotes *Divifion* alfo ; as, 2)4(2 : *i. e.* 4 *divided* by 2, is *equal* to 2.

$\frac{4761}{32}$ Numbers placed in a Fraction-like manner, do likewife denote *Divifion*; the lower Number being the *Divifor*, and the upper Number the *Dividend*.

:: Four Points, fet in the middle of four Numbers, denote them to be proportional to one another, by the *Rule of Three*; as, 2 . . 4 :: 8 . . 16 : that is, as 2 is to 4, fo is 8 to 16.

N. B. *Some Mafters, inftead of* Points, *ufe long* Strokes *to keep the* Terms *feparate, but it is wrong to do fo ; for the two* Points *between the* firft *and* fecond Terms, *and alfo between the* third *and* fourth Terms, *fhew that the two* firft, *and the two* laft Terms *are in the fame Proportion. And whereas* four Points *are put between the* fecond *and* third Terms, *they ferve to disjoint them, and fhew that the* fecond *and* third, *and* firft *and* fourth Terms *are not in the fame direct Proportion to each other as are thofe before mentioned.*

Mony

Explication *of some* Marks, *&c.*

£. Libræ, Pounds.
S. Solidi, Shillings.
D. Denarii, Pence.
Qrs. Quadrantes, Farthings.

$\overline{2 + 3} \times 5 = 25$, Signifies that the Sum of 2 and 3 *multiplied* by 5, is *equal* to 25.

$\overline{3 - 2} \times 5 = 5$, Signifies that the Difference between 3 and 2, *multiplied* by 5, is *equal* to 5.

$\sqrt{}$ *or* $\sqrt{}$ *q.* Prefixt to any Number, supposes that the *Square-Root* of that *Number* is required. Sometimes it is the Sign of *Irrationality*, and signifies that the *Square-Root* of such a *Number* can never be truly found.

$\sqrt{}$ *c.* Prefixt to any Number, supposes that the *Cube-Root* of that *Number* is required. Sometimes it is the Sign of *Irrationality*, and signifies that the *Cube-Root* of such a *Number* can never be truly found.

$3aa + 3a$, Signifies 3 times the *Square* of *a*, more 3 times *a*.

$3aae + 3eea + eee$, Signifies 3 times the *Square* of *a*, multiplied by *e* ; more 3 times the *Square* of *e*, multiplied by *a* ; more the *Cube* of *e*, as in the *Cube-Root*.

THE

PART I.

Of Arithmetic in Whole Numbers.

The INTRODUCTION.

Of Arithmetic in general.

Q. *W*HAT *is* Arithmetic ?

A. Arithmetic is the Art or Science of computing by Numbers, either Whole or in Fractions.

Q. *What is* Number ?

A. Number is one or more Quantities, answering to the Question, *How many ?*

Q. *What is Arithmetic in* Whole Numbers ?

A. Arithmetic *in Whole Numbers* or *Integers*, supposes its Numbers to be entire Quantities, and not divided into Parts.

Q. *What is Arithmetic in* Fractions ?

A. Arithmetic in *Fractions*, supposes its Numbers to be the Parts of some entire Quantity.

Q. *How do you consider Arithmetic with regard to* Art *and* Science?

A. Both in *Theory* and *Practice.*

Q. *What is* Theoretical Arithmetic ?

A. Theoretical Arithmetic considers the Nature and Quality of Numbers, and demonstrates the Reason of Practical Operations. And in this Sense Arithmetic is a *Science.*

Q. *What is* Practical Arithmetic ?

A. Practical Arithmetic is that which shews the Method of working by Numbers, so as may be most useful and expeditious for Business. And in this Sense Arithmetic is an *Art.*

Q. *What is the Nature of all* Arithmetical Operations ?

A. The Nature of all *Arithmetical Operations* is, by some Quantities that are given, to find out others that are required.

Q. *Which are the fundamental Rules in* Arithmetic ?

A. These Five ; *Notation, Addition, Subtraction, Multiplication* and *Division.*

B

Of

Of NOTATION.

Q. WHAT *is* Notation?

A. It is the *Art* of expreffing *Numbers* by certain *Characters* or *Figures.*

Q. *What is the* Ufe *of* Notation?

A. Notation teaches to read and write Numbers by their true Value.

Q. *How many Sorts of* Characters *or* Figures *are Numbers ufually expreffed by?*

A. Two, *viz.* The *Arabic Figures and the Latin Letters.*

Q. *How are the* Arabic Figures *exprefs'd?*

A. The *Arabic Figures* are thus exprefs'd; *One* 1, *Two* 2, *Three* 3, *Four* 4, *Five* 5, *Six* 6, *Seven* 7, *Eight* 8, *Nine* 9, *Nought* or *Cypher* 0. And this is the *Notation* or reading and writing of every fingle Figure.

Q. *How far may the Ufe of thefe* Figures *be extended?*

A. Thefe ten *Characters* or *Figures* may be ufed to exprefs all manner of Numbers, from the leaft to the greateft, that can be conceived; even without End.

Q. *How many* Figures *are fufficient to exprefs moft ordinary Concerns?*

A. Nine; and therefore the Table of *Notation* commonly extends no farther than to *nine* Places.

Q. *Why does it confift of* nine *Places rather than of* eight *or* ten?

A. Becaufe they make up three *even* Periods.

Q. *What do you mean by a* Period?

A. A *Period* is a Quantity exprefs'd by three Figures, whereof the firft to the right Hand fignifies fo many *Units*, or fingle Things; the fecond fo many *Tens*; and the third fo many *Hundreds.*

Q. *Why are three Figures called a* Period?

A. Becaufe if the Number be increafed above *three* Places, there is ftill the fame periodical Return of the Value of thofe Places, and every *third* Figure to the left Hand, will always be *Hundreds*, if it be never fo far extended.

Q. *Is an* Unit *or* one, *a Number?*

A. An *Unit* is a Number, becaufe it may properly anfwer the Queftion, *How many?*

Q. *Give an Examples or two?*

A. How many *Gods* do we believe? The Anfwer is, *One.* How many *Sundays* in the Compafs of a Week? Anfwer *One.*

Q. *In what Nature or Proportion of Value, do* Numbers *increafe from the* Units *Place to the left Hand?*

A. By *Tens.*

Q. *How*

Q. *How must they be read?*

A. From the left to the right Hand.

Q. *If two Figures are given to be read together, how must they be valued?*

A. The first Figure towards the right Hand is *Units*, and the next to that is so many *Tens*; as 89, *Eighty-nine*. Where 9 is in the Place of *Units*, and 8 is in the Place of *Tens*; for 8 *Tens* are properly called *Eighty*.

Q. *If three Figures or a whole Period be given, how is it to be valued?*

A. Beginning at the last Figure on the right Hand, I value them *Units*, *Tens*, *Hundreds*; as 789, *Seven Hundred and Eighty-nine*.

Note 1, As every Third Figure *from the Place of* Units, *bears the Name of* Hundreds: *So for any great Sum to be distinguished into* Periods *(as in the following* Tables*) will be of good Use to the Learner, in the easier valuing and expressing that Sum.*

2. *There is also another sort of* Periods, *which some distinguish thus, viz.* Millions, Millions of Millions, &c. *and others thus, viz* Millions, Billions, Trillions, &c. *each Period consisting of 6 Places, but as Periods of this Kind seldom or never occur in* Business, *it is sufficient only to mention them in this Place, without saying any thing further about them.*

TABLE I.

Third Period. {		Second Period. {		First Period. {	
C. Millions	X Millions	Millions	C Thousands	X Thousands	Thousands	Hundreds	Tens	Units

Third Period.			Second Period.			First Period.		
								9
							8	9
						7	8	9
					9	7	8	9
				8	9	7	8	9
			7	8	9	7	8	9
		9	7	8	9	7	8	9
	8	9	7	8	9	7	8	9
7	8	9	7	8	9	7	8	9

TABLE II.

Third Period. {		Second Period. {		First Period. {	
C Millions	X Millions	Millions	C Thousands	X Thousands	Thousands	Hundreds	Tens	Units

Third Period.			Second Period.			First Period.		
								4
							7	3
						9	6	5
					3	4	7	2
				4	8	9	1	3
			7	3	1	2	3	6
		3	1	2	7	1	4	8
	4	3	1	9	2	7	6	4
5	7	3	1	2	9	8	4	2

Note, See the Notation of Numbers by *Latin Letters,* in the *New Guide to the* English *Tongue.* p. 88.

EXAMPLES *for Practice.*

Write down in proper Figures the following Numbers, viz.

Twenty-nine.

Three Hundred and Forty-eight.

Seven Thoufand, two hundred and twenty-fix.

One Thoufand, three hundred and ninety.

Nineteen Thoufand, feven hundred and twenty-eight.

Four Hundred and twenty-feven Thoufand, three hundred and ninety-fix.

Nine Hundred and forty-two Thoufand, feven Hundred.

Four Millions, feven hundred and eighty-nine Thoufand, three hundred and twenty-eight.

Seven Millions, nine hundred and forty-two Thoufand, four hundred and feventy-five.

Twenty-fix Millions, three hundred and fourteen Thoufand, one hundred and ninety-five.

One Hundred and ninety-feven Millions, four hundred and thirty-fix Thoufand, one hundred and ninety-one.

Seven Hundred and fourteen Millions, one hundred and nineteen Thoufand, feven hundred and four.

Write down in Words at Length the following Numbers, viz.

7——— 19——— 846——— 7428——— 61261——— 370121———
7126172——— 74680218——— 461272615.

Of ADDITION.

Q. WHAT *is the Ufe of* Addition?

A. *Addition* teacheth to bring feveral particular Numbers into one total Sum.

Q. *How many Sorts of* Addition *are there?*

A. Two, *viz. Simple* and *Compound.*

Of *Simple* ADDITION.

Q. *What is* Simple Addition?

A. *Simple* or *Single Addition,* is the adding of feveral Numbers together, whofe Signification is the fame; as 6 Yards and 8 Yards make 14 Yards.

Q. *If feveral Numbers are given to be added into one Sum, how are they to be placed?*

A. They muft be placed in fuch manner, that *Units* may ftand under *Units*; *Tens* under *Ten*, &c. *Pounds* under *Pounds*; *Shillings* under *Shillings*, &c.

Q. *How do you prove* Addition?

A. The beft Way of proving *Addition* is to begin at the Top of the Sum, and reckon the Figures downward in the fame

manner

manner that they were added upward : and if the fecond Line or Sum Total be equal to the firſt, it is right.

EXAMPLES *for Practice.*

£	Yds.	Gals.	Tons.	Hhds.	lb.
4	43	764	3746	47476	461743
7	17	147	7416	73712	761710
3	19	384	3406	31819	476312
2	14	736	7198	41243	126712
1	37	197	3173	71208	310748
7	46	473	4731	70956	471381
6	23	382	1262	81461	704714
4	59	769	4731	31269	312624
7	94	367	7169	74196	781462
77					

Miles.	Leagues.	Years.
4734736	46431734	347312484
3474312	71261374	168126312
4161322	12612714	718126191
7369138	31371261	731618191
3142618	74147312	312134716
4731216	47312614	171216198
4713147	74167571	312614712
3712612	31216126	171614712
7126981	31187412	312814795

Of Compound ADDITION.

Q. What is Compound Addition ?

A. Compound Addition is the adding of feveral Numbers to-gether, having divers Denominations.

1. *Of* MONY.

Q. What are the Denominations of Englifh Mony ?

A.   4 Farthings make 1 Penny.

       12 Pence —— 1 Shilling.

       20 Shillings —— 1 Pound Sterling.

       Q. Are

Q. *Are there no other Names of* Mony *used in* England ?
A. Yes ; such as,

		£	s.	d.
A Moidore	=	1	7	0
A Guinea	=	1	1	0
A Half Guinea	=	0	10	6
A Crown	=	0	5	0
A Half Crown	=	0	2	6

☞ There are also several smaller Pieces which speak their own Value ; as, a *Six-pence, Four-pence, Three-pence, Two-pence, Penny, Halfpenny,* and *Farthing.*

Note, *The following Pieces were formerly current, but now not so, being only imaginary.*

		£	s.	d.
A Carolus	=	1	3	0
A Jacobus	=	1	5	0
A Mark	=	0	13	4
An Angel	=	0	10	0
A noble	=	0	6	8

The Pound Sterling is also an imaginary Sum.

Q. *Are there not some* Tables *that may be learned by* Heart ?
A. Yes ; these following, called *Pence-Tables.*

d.		s.	d.		s.		d.
20	=	1	8		2	=	24
30	=	2	6		3	=	36
40	=	3	4		4	=	48
50	=	4	2		5	=	60
60	=	5	0		6	=	72
70	=	5	10		7	=	84
80	=	6	8		8	=	96
90	=	7	6		9	=	108
100	=	8	4		10	=	120
110	=	9	2		11	=	132
120	=	10	0		12	=	144

Note 1, *Tho' I say these* Tables *may be learnt by* Heart, *I do not say they must, for then, by the same Rule, it would be necessary to have Tables to every Rule in Addition, which nobody uses, and not every one the Pence-Tables ; because when they are learnt never so perfectly, their Use extends no farther than Mony ; and therefore, they may very well be omitted, and a better Method substituted in their room ; I mean that of Pointing, which, I am sure, is both easier and safer, to Beginners especially. However, I chose to set them down in their Place, that they, who approve of them, may use them ; and they who do not, can easily omit them.*
2. *As all the Parts of* Addition *are built upon the same* Reason ; *so the Method of Pointing may serve as a general Rule, when any Denomination is to be added ; and this may be done without defacing the Figures.*

E X A M-

EXAMPLES.

£	s.	d.
4	3	6
1	7	8¼
2	7	4
1	9	4½
3	1	3¾
1	2	1
4	7	6½
3	1	9

£	s.	d.
1	1	3
3	8	1¼
1	1	6
3	4	7½
1	2	6
3	2	8¼
7	4	6
4	1	7¾

£	s.	d.
4	1	6½
1	2	7
3	1	4¼
3	3	6
1	4	1½
3	1	2
1	5	8½
3	1	2

£	s.	d.
14	12	1
17	11	2¾
19	12	1⅛
16	13	1¾
12	13	6
14	12	7¼
19	13	4
12	11	6

£	s.	d.
19	13	4
12	11	6
17	14	1¼
19	13	4½
12	11	6
19	13	1¾
16	12	1
19	11	4¼

£	s.	d.
47	12	11
17	10	11
17	10	4½
31	12	6
11	19	4
12	12	6¾
11	13	1
11	11	2¼

£	s.	d.
21	12	10½
31	11	11½
47	12	10¼
19	11	4
31	12	6½
12	11	4¾
37	11	4
19	11	3

£	s.	d.
17	13	10
71	15	8
19	4	6¼
12	3	1
26	1	6
31	11	1
14	12	6¼
18	18	7

£	s.	d.
44	12	6¼
31	18	1½
47	12	4
14	12	10¾
16	14	11
19	12	2
16	11	3
17	11	1¼

£	s.	d.
21	11	11½
16	12	6
11	9	10½
16	12	4¼
34	1	10
17	14	11¼
71	3	8¾
16	1	4

£	s.	d.
47	12	6¼
16	19	11½
17	12	10¼
19	12	10
17	12	11¾
17	19	4½
47	13	6
72	18	6

£	s	d.
47	11	3¼
31	17	3
17	13	11¾
18	14	10½
16	15	11
17	14	3¼
11	18	6
17	17	3

A Mercer's

A *Mercer's* Bill.
Bought of *George Baily, May* 17, 1770.

			s.	d.		£	s.	d.
9 *Yards of Silk*	—	—	— at 14	6	*per Yd.*	6	10	6
12 *Yards of flower'd Silk*	—	— at 16	8	—	10	0	0
16 *Yards of Sarfenet*	—	—	— at 6	9	—	5	8	0
10 *Yards of Sattin*	—	—	— at 9	6	—	4	15	0
15 *Yards of Brocade*	—	—	— at 10	8	—	8	0	0
11 *Scarves*	—	—	— at 2	0	*each*	1	2	0
14 *Yards of Genoa Velvet*	—	— at 17	4	*per Yd.*	12	2	8
10 *Yards of Lustring*	—	—	— at 5	2	—	2	11	8

Sum

A *Woollen Draper's* Bill.
Bought of *Thomas Simmons, June* 19, 1770.

			s.	d.		£	s.	d.
16 *Yards of Drugget*	—	— at 7	0	*per Yd.*	5	12	0
12 *Yards of Broad Cloth*	—	— at 15	0	—	9	0	0
9 *Yards of black Cloth*	—	— at 16	5	—	7	7	9
10 *Yards of Shalloon*	—	— at 1	8	—	0	16	8
15 *Yards of Serge*	—	— at 1	10	—	1	7	6
7 *Yards of fine Spanish Black*	— at 18	0	—	6	6	0
16 *Yards of Frieze*	—	— at 4	6	—	3	12	0
12 *Yards of superfine Scarlet*	— at 18	0	—	10	16	0

Sum

A *Linen-draper's* Bill.
Bought of *John Clay, July* 17, 1770.

			s.	d.		£	s.	d.
26 *Ells of Dowlas*	—	— at 1	4	*per Ell*	1	14	8
18 *Ells of Holland*	—	— at 4	0	—	3	12	0
12 *Ells of Diaper*	—	— at 1	0	—	0	12	0
12 *Damask Napkins*	—	— at 2	0	*each*	1	4	0
20 *Yards of printed Linen*	— at 2	0	*per Yd.*	2	0	0
10 *Yards of Cambric*	—	— at 12	0	—	6	0	0
10 *Yards of Muslin*	—	— at 7	0	—	3	10	0
14 *Yards of Canvas*	—	— at 3	4	—	2	6	8

Sum

A Grocer's Bill.

Bought of *Thomas Hartley,* May 19, 1770.

			s.	d.		£	s.	d.
8 lb. *of Raisins of the Sun* —	—	at	0	5	*per* lb.	0	3	4
15 lb. *of Malaga Raisins* —	—	at	0	4½	——	0	5	7½
10 lb. *of Currants* —	—	at	0	6½	——	0	5	5
11 lb. *of Sugar* —	—	at	0	4½	——	0	4	1½
2 *Sugar Loaves,* wt. 15 lb.	—	at	0	9	——	0	11	3
13 lb. *of Rice* —	—	at	0	3	——	0	3	3
5 lb *of Black Pepper* —	—	at	1	6	·——	0	7	6
10 Oz. *of Cloves* —	—	at	0	10	*per oz.*	0	8	4

Sum

A Cheesemonger's Bill.

Bought of *Daniel Bridge,* July 17, 1770.

			s.	d.		£	s.	d.
3 *Gloucestershire Cheeses,* wt. 24 lb.	at	0	4	*per* lb.	0	8	0
3 *Warwickshire* — wt. 20 lb.	at	0	3	——	0	5	0
1 *Cheshire* — — wt. 28 lb.	at	0	4	——	0	9	4
½ *Firkin of Butter* — wt. 28 lb.	at	0	6	——	0	14	0
1 *Flitch of Bacon* — wt. 6 Sto.	at	4	0 *per Sto.*	1	4	0
7 lb. *of Cambridge Butter* — —	at	0	6	*per* lb.	0	3	6
9 lb. *of new Cheese* — —	at	0	4	——	0	3	0
7 lb. *of Cream Cheese* — —	at	0	6	——	0	3	6

Sum.

A Milliner's Bill.

Bought of *Jane Inman,* August 28, 1770.

			s.	d.		£	s.	d.
15 *Yards of Silver Ribbon* —	—	at	2	3	*per Yd.*	1	13	9
3 *Pair of fine Kid Gloves* —	at	2	0	*p. Pair*	0	6	0
6 *Dozen of Irish Lamb ditto* —	at	1	0	——	3	12	0
6 *Sarsenet Hoods* — —	at	4	6	*each*	1	7	0
15 *Fans, India Mounts* — —	at	4	0	——	3	0	0
3 *Setts of Knots* — —	at	2	0	*per Sett*	0	6	0
16 *Yards of fine Lace* — —	at	10	0	*per Ya.*	8	0	0
20 *Pieces of Bobbin* — —	at	0	6	*p. Piece*	0	10	0

Sum

A Carpenter's Bill.

Mr. *John Law*, Dr. to *John Brooks*, for Carpenter's Work and Materials, *viz.*

1770		s.	d.	£	s.	d.
May 3 For 30 *Feet of Fir Timber*, at	0	3	*per Foot*	0	7	6
5 —— 18 *whole Deals* — at	1	6	*each*	1	7	0
—— 16 *slit Deals* —— — at	1	0	——	0	16	0
—— 4 *Hundred of six-penny Nails*			——	0	2	0
—— 3 *Hundred of ten-penny Nails*			——	0	2	6
—— 6 *Hundred of Brads* — —			——	0	1	6
21 —— 18 *Days Work* — at 3	0		*per Day*	2	14	0

Sum

A Baker's Bill.

Mr. *Thomas Marriot*, Dr. to *James Barnet*, viz.

1770	£	s.	d.
Feb. 4 For *a Peck of Bran* — — — — —	0	0	3
—— *a fine Peck Loaf* — — — — —	0	1	8
13 —— *a Peck of fine Flour* — — — —	0	1	8
17 —— *a Bushel of Pollard* — — — —	0	1	0
18 —— *small Bread* — — — — —	0	0	$2\frac{1}{2}$
—— *Yest* — — — — — —	0	0	1
—— *a half Peck second Loaf* — — —	0	0	9
20 —— *a quartern second Loaf* — — —	0	0	$4\frac{1}{2}$

Sum

A Bill of Disbursement.

1770	£	s.	d.
Feb. 17 *Laid out in Lamb, seven Groats* — — —			
18 —— *in Sallad, five Farthings* — — —			
21 —— *in Beef, nineteen Pence, Halfpenny* —			
Mar. 7 —— *in Parsnips, three Halfpence* — —			
8 —— *in Potatoes, a Groat* — — —			
9 —— *in Candles, seven Groats and Three Pence* — — — — — —			
10 —— *in Butter and Cheese, eight and twenty-pence* — — — — —			
12 —— *in Bread three and twenty Pence* — —			

Sum

Suppose

Suppoſe I am indebted   £   s.   d.

To A, *twenty Pounds, ſeven Shillings and four* }
        Pence Farthing — — — — — }

— B, *nineteen Pounds, thirteen Shillings and* }
        ten Pence Halfpenny — — — — }

— C, *twelve Pounds, fourteen Shillings and* }
        ſeven Pence three Farthings — — }

— D, *Twenty-ſix Pounds, ſeventeen Shillings* }
        and four Pence Farthing — — — }

— E, *twenty eight Pounds, thirteen Shillings* }
        and ſeven Pence three Farthings — — }

— F, *twenty-one Pounds, fifteen Shillings and* }
        five Pence Halfpenny — — — }

— G. *five Pounds, ſix Shillings and ſeven Pence* }
        Farthing — — — — — }

How much is the Debt?   Sum

2. Of TROY-WEIGHT.

Q. *Which are the Denominations of* Troy-Weight?

A.   24 Grains, or *gr.* make 1 Pennyweight, *dwt.*
        20 Pennyweights ——— 1 Ounce, *oz.*
        12 Ounces ——— ——— 1 Pound, *lb.*

Q. *What ſort of Things are weighed by this Weight?*

A. Gold, Silver, Jewels, Electuaries, and all Liquors.

Q. *What is the Standard for* Gold?

A. 22 *Carrats* of fine Gold, and 2 *Carrats* of Copper be-
ing melted together, are eſteemed the true Standard for *Gold*
Coin.

Q. *What is a* Carrat?

A. A *Carrat* is not any certain Quantity or Weight, but
the twenty-fourth Part of any Quantity or Weight.

Q. *What is the Standard for* Silver?

A. 11 *oz.* 2 *dwts.* of fine Silver, and 18 *dwts.* of Copper
being melted together, are eſteemed the true Standard for
Silver-Coin; called *Silver Sterling.*

Note, *The Ounce of Silver being valued at* 5 Shillings, *one Pennyweight*
will be valued at three Pence, *and the Grain at Half a Farthing.*

                                            E X A M-

EXAMPLES.

Oz. dw gr.			Oz. dw. gr.			lb. oz. dw. gr.				lb. oz. dw. gr.			
7	10	12	7	13	12	4	10	12	11	7	10	12	10
6	11	11	6	11	14	3	11	16	12	3	4	16	13
5	16	11	9	12	17	1	4	16	19	3	7	12	11
4	17	10	4	16	13	3	3	11	17	1	1	18	16
1	12	16	7	11	14	4	1	16	14	3	11	16	12
7	12	18	6	19	12	3	3	16	11	4	3	16	21
9	16	19	7	13	16	7	11	16	10	3	3	13	11
8	14	16	3	19	14	6	4	13	15	3	7	18	19
4	16	10	5	9	8	5	11	14	13	9	8	19	9
9	4	8	6	12	13	9	10	15	14	7	11	12	8

3. *Of* AVOIRDUPOIS-WEIGHT.

Q. *Which are the Denominations of* Avoirdupois-Weight ?
A. 16 Drams, or *dr.* make 1 Ounce, *oz.*
   16 Ounces —— —— 1 Pound, *lb.*
   28 Pounds —— —— 1 Quarter of an Hundred Weight, *qr.*
   4 Quarters – —— 1 Hundred Weight, or 112 Pounds, *C.*
   20 Hundred Wt. —— 1 Ton, *T.*

Q. *What is the Ufe of* Avoirdupois-Weight ?
A. *Avoirdupois Weight* is ufed in weighing any Thing of a coarfe and droffy Nature, as all Grocery and Chandlers Wares, and all Metals but *Silver* and *Gold.*

Note, *Bread formerly was weighed by* Troy-Weight, *but is now at* London *weigh'd by this Weight.*

Q. *What is the Difference between a Pound* Avoirdupois *and a Pound* Troy ?
A. The Pound *Avoirdupoi* is equal to 14 *oz.* 11 *dwt.* 15 *gr.* and an half *Troy* ; and the Pound *Troy* is equal to 13 *oz.* 2 *dr.* and an half, and $\frac{9122}{13999}$ *Avoirdupois.*

Q. *What other Denominations are there in this Weight ?*
A. There are feveral other Denominations in *Avoirdupois Weight,* in fome particular Goods, and others only cuftomary in fome particular Places ; as appears by the following Table.

TABLE.

T A B L E.

	lb.		lb.
A Firkin of Butter is —	56	A Burden of Gad-Steel, or 9 Score -	180
—— of Soap is — —	64		
A Barrel of Pot Ash is -	200	A Quintal of Fish in *Newfoundland* is —	100
—— Anchovies is —	30		
—— Candles is — —	120	A Stone of Glass is —	5
—— Figs, from — —	98	A Seam of Glass is 24 Stone, or — —	120
to 2 *C.* 3*qrs.* —			
—— Soap is — — —	256	*For Cheese and Butter.*	
—— Butter is — —	224	A Clove or half Stone is	8
—— Gunpowder is —	112	A Wey in *Suffolk* is 32 Cloves, or —	256
—— Raisins is , — —	112		
A double Barrel of Anchovies is — —	60	—— *Essex* is 42 Cloves or	336
		For Wool.	
A Puncheon of Prunes is 10*C.* or 12*C.*		A Clove is — — — —	7
		A Stone is — — — —	14
A Fother of Lead is 19*C.* 2*qrs.*		A Tod is — — — —	28
A Stone of Iron or Shot is	14	A Wey is 6 Tod and 1 Stone, or — —	182
—— Butchers Meat is	8		
A Gallon of Train Oil is	7½	A Sack is 2 Weys, or —	364
A Faggot of Steel is —	120	A Last is 12 Sacks, or	4368

E X A M P L E S.

T.	C.	qr.	lb.	C.	qr.	lb.	lb.	oz.	dr.	lb.	oz.	dr.
7	11	1	16	17	1	12	14	10	12	12	11	10
1	12	3	11	16	2	11	16	12	11	17	12	10
3	4	1	17	14	1	12	19	12	12	14	12	13
3	1	2	12	16	3	19	17	12	13	16	12	11
7	11	1	11	19	1	12	14	11	10	19	12	11
6	3	2	13	16	3	18	16	15	14	17	13	4
3	1	2	20	12	1	18	13	11	14	16	11	3
4	1	3	26	16	3	19	17	12	10	21	10	7

4. *Of* A P O T H E C A R I E S-W E I G H T.

Q. Which are the Denominations of Apothecaries-Weight *?*

A. 20 Grains, or *gr.* make 1 Scruple, Э.

3 Scruples —— —— 1 Dram, ʒ.

8 Drams —— —— 1 Ounce, ℥.

12 Ounces —— —— 1 Pound, ℔.

Q. What

Q. *What is the Ufe of* Apothecaries-Weight?

A. *Apothecaries-Weight* is fuch as their *Medicines* are compounded by.

Note 1, *The* Apothecaries *mix their* Medicines *by this Rule, yet buy and fell their Commodities by* Avoirdupois Weight.

2. *The* Apothecaries Pound and Ounce, *and the* Pound and Ounce Troy, *are the fame, only differently divided and fubdivided.*

E X A M P L E S.

℔	℥	ʒ	℈	gr.	℔	℥	ʒ	℈	gr.	℔	℥	ʒ	℈	gr.
3	11	7	2	19	7	1	3	1	10	7	3	1	2	11
1	3	4	1	13	0	1	2	1	14	6	2	7	1	14
0	1	7	2	12	7	3	4	1	12	3	7	2	1	11
1	2	6	2	11	6	1	1	2	11	1	3	1	0	10
2	1	3	1	12	0	0	3	2	17	2	1	2	1	12
1	2	4	0	11	0	1	0	0	10	1	3	1	2	11
7	10	3	1	16	0	1	2	0	10	4	3	1	2	11
1	7	6	1	15	0	3	7	2	19	7	3	2	1	13

5. Of LONG MEASURE.

Q. *Which are the Denominations of* Long Meafure?

A. 3 Barly Corns, or *B.c.* make 1 Inch, *In.*
4 Inches —— —— —— 1 Hand, *hd.*
12 Inches —— —— —— 1 Foot, *Ft.*
3 Feet —— —— —— 1 Yard, *yd.*
6 Feet —— —— —— 1 Fathom, *Fa.*
5 Yards and a Half —— 1 Rod, Pole, or Perch, *Po.*
40 Poles —— —— —— 1 Furlong, *Fu.*
8 Furlongs —— —— —— 1 Mile, *M.*
3 Miles —— —— —— 1 League, *L.*
60 Miles —— —— —— 1 Degree, *Deg.*

Note, *A* Degree *is* 69 Miles *and* 4 Furlongs, *very near, tho' commonly reckoned but* 60 Miles.

Q. *What is the Ufe of* Long Meafure ?

A. To meafure Diftances of Places, or any thing elfe, where *Length* is confidered, without Regard to the Breadth.

Q. *Is the* Pole *or* Perch *always of the fame Length?*

A. No.

Q. *What is the Difference?*

A. Five Yards and an Half are the Statute-Meafure for a *Pole* or *Perch*; but for Fens and Wood-lands, it is cuftomary to reckon 18 Feet to the Pole; and for Forefts 21 Feet.

Q. *What*

Q. *What is the Use of an* Hand ?
A. It is used to measure Horses.
Q. *What is the Use of a* Fathom ?
A. It is used to measure Depths.

EXAMPLES.

M.	f.	p.	Yds.	f.	in.	Le.	m.	f.	p.	Yds.	f.	in.	b.e.
17	7	19	14	2	7	17	2	6	14	16	1	0	0
16	1	14	16	0	4	12	1	1	18	14	2	10	1
19	3	16	19	1	10	16	2	1	16	17	1	4	2
17	4	19	16	2	4	19	2	7	11	13	2	11	1
12	1	11	14	2	5	19	0	4	31	16	1	7	2
18	3	16	14	2	1	17	1	1	12	17	1	4	1
19	7	14	31	1	3	12	1	2	17	19	2	6	2
16	6	26	11	0	1	17	1	1	14	19	2	1	2

6. *Of* CLOTH-MEASURE.

Q. *Which are the Denominations of* Cloth-Measure ?
A. 2 Inches, or *in.* and a Quarter make 1 Nail, *N.*
4 Nails —— —— —— —— 1 Qr. of a Yard, *qr.*
4 Quarters —— —— —— 1 Yard, *yd.*
3 Quarters of a Yard —— —— 1 Flemish Ell, *F. E.*
5 Quarters of a Yard —— —— 1 English Ell, *E.*

Note 1, *The* Yard *is used in measuring all sorts of* Woollen Cloths, wrought
Silks, *most* Linens, Tape, *and* Gartering.
2. *The* Ell English *is used only in measuring some particular* Linens, *called*
Hollands.
3. *The* Ell Flemish *is used in measuring* Tapestry.

EXAMPLES.

Yds.	qrs.	na.	Ells	qrs.	na.	Yds.	qrs.	na.	E.F.	qrs.	na.
17	1	1	14	1	2	17	2	1	17	1	2
11	3	1	17	3	1	16	3	3	17	1	3
16	1	2	14	4	1	17	1	2	14	1	2
19	3	1	16	3	2	19	2	1	16	2	0
17	1	2	19	1	1	17	3	2	14	0	0
12	3	3	17	2	3	16	1	3	19	2	1
19	1	1	16	3	1	19	2	1	17	2	2
14	2	3	15	1	2	27	1	2	16	1	3

7. *Of*

7. *Of* L A N D - M E A S U R E.

Q. *Which are the Denominations of* Land-Meafure ?
A.　9 Square Feet, or *Ft.*　——　make 1 Yard, *Y.*
　　30 Yards and a Quarter　——　——　1 Pole, *Po.*
　　40 Poles in Length and 1 in Breadth 1 Rood, *R.*
　　4 Roods ——　——　——　1 Acre, *A.*

Q. *What is the Ufe of* Land-Meafure ?
A. It gives the Content of any Piece of Ground in Acres.

E X A M P L E S.

A.	r.	p.	A.	r.	p.	A.	r.	p.
17	3	12	17	1	12	26	1	36
11	2	19	11	2	13	13	2	22
15	1	21	16	3	27	23	3	13
16	1	12	19	1	16	36	2	28
17	2	11	12	3	14	22	2	33
13	2	12	16	1	11	19	0	19
11	1	17	17	3	14	33	3	16
21	3	21	12	1	11	17	2	24

8. *Of* L I Q U I D - M E A S U R E.

Q. *How many forts of* Liquid-Meafure *are there ?*
A. Two: *Wine-Meafure* and *Winchefter-Meafure.*
Q. *What is meant by* Winchefter-Meafure ?
A. It is a particular Meafure ufed for Beer and Ale.
Q. *What is the Difference between* Wine-Meafure *and* Winchefter-Meafure ?
A. A Gallon of Wine is 231 folid Inches ; but a Gallon of *Beer* or *Ale* exceeds that Meafure by 51 Inches, and is 282 folid Inches.

(1) *Of* W I N E - M E A S U R E.

Q. *Which are the Denominations of* Wine-Meafure ?
A. 2 Pints, or *pts.* make 1 Quart, *qt.*
　　4 Quarts ——　——　1 Gallon, *gal.*
　10 Gallons ——　——　1 Anchor of Brandy or Rum, *An.*
　18 Gallons ——　——　1 Runlet, *R.*
　31½ Gallons ——　——　1 Barrel, *Bar.*
　42 Gallons ——　——　1 Tierce, *T.*
　63 Gallons ——　——　1 Hogfhead, *bhd.*
　84 Gallons ——　——　1 Puncheon, *Pu.*
　2 Hogfheads ——　1 Pipe or Butt, *P.*
　2 Pipes or 4 Hogfheads 1 Tun, *T.*

Q. *What other Liquors are measured by the* Wine-Standard ?
A. All Brandies, Spirits, Strong Waters, Perry, Cyder, Mead, Vinegar, Hony and Oil.

Note, Milk *is also retail'd by this* Standard, *not by* Law, *but* Custom *only.*

EXAMPLES.

T.hhds.	gal.	qts.	Hhds.	gal.	qts.	Tier.	gal.	qts.
7 1	12	2	27	10	2	27	12	1
6 3	31	3	22	13	3	29	17	3
7 1	41	2	26	11	3	22	11	2
6 2	17	1	29	12	2	27	31	3
7 3	14	3	23	22	0	29	12	1
1 2	19	1	27	32	2	27	11	2
9 1	15	2	29	27	3	26	17	1
3 1	11	2	26	33	2	22	11	3

(2) *Of* WINCHESTER-MEASURE.

Q. *Which are the Denominations of* Winchester-Measure ?
A. 2 Pints, or *pts.* —— —— make 1 Quart, *qt.*
    4 Quarts —— —— —— 1 Gallon, *gal.*
    8 Gallons —— —— —— 1 Firkin of Ale, *Fir.*
    9 Gallons —— —— —— 1 Firkin of Beer, *Fir.*
    2 Firkins —— —— —— 1 Kilderkin, *Kil.*
    4 Firkins —— —— —— 1 Barrel, *Bar.*
    1 Barrel and a Half, or 54 Gallons 1 Hogshead of Beer,*hhd.*

Q. *What is the Difference bet-ween* Ale *and* Beer-Measure ?
A. In *London* only they compute 8 Gallons to the *Firkin* of *Ale*, and 32 Gallons to the *Barrel*; but in all other Parts of *England*, for *Ale*, *Strong Beer*, and *Small Beer*, 34 Gallons are computed to the *Barrel*, and 8 Gallons and an Half to the *Firkin*.

Q. *What other Commodities are there, that go by the* Winchester-Measure ?
A.   A Barrel of *Salmon* or *Eels* is 42 Gallons.
      A Barrel of *Herrings* —— 32 Gallons.
      A Keg of *Sturgeon* —— 4 or 5 Gallons.
      A Firkin of *Soap* — —— 8 Gallons.

EXAM-

EXAMPLES.

Hds.	gals.	qts.	B.B.	fir.	gal.	Hhts.	gals.	qts.	A B.	fir.	gal.
7	12	1	23	3	3	26	17	1	23	1	7
6	27	2	27	2	6	13	19	2	24	2	6
3	21	2	29	3	7	21	16	3	27	1	5
2	11	1	27	2	8	31	18	2	27	3	4
3	17	2	26	1	5	27	10	1	26	3	2
2	12	1	37	1	4	31	18	2	27	1	3
6	17	3	27	1	3	26	31	1	26	2	1
7	31	2	32	2	2	31	26	2	29	2	0

9. Of DRY MEASURE.

Q. *Which are the usual Denominations of* Dry Measure?

A.   2 Pints, or *pts.* make 1 Quart, *qt.*
       2 Quarts — —— 1 Pottle, *Pot.*
       2 Pottles — —— 1 Gallon, *gal.*
       2 Gallons — —— 1 Peck, *P.*
       4 Pecks — —— 1 Bushel, *Bush.*
       8 Bushels — —— 1 Quarter of Corn, *qr.*
       36 Bushels — —— 1 Chaldron of Coals, *Ch.*

Q. *Wherein does* London *differ from other Places in* England *in the* Coal Measure?

A. In *London* 36 Bushels make a Chaldron; but in all other Places 32 Bushels make a Chaldron. The Bushel also in Water-Measure contains 5 Pecks.

Q. *What other Denominations are there in* Dry Measure?

A.   A Score of Coals — — is 21 Chaldrons.
       A Sack of Coals — —— 3 Bushels.
       A Sack of Corn — —— 4 Bushels.
       10 Quarters of Corn make 1 Wey.
       12 Weys—— —— —— 1 Last.
       A Load of Corn —— — is 5 Bushels.
       A Cart load ditto — —— 40 Bushels.

Q. *What is the Use of* Dry Measure?

A. Dry Measure is applied to all dry Goods, as *Corn, Seeds, Fruit, Roots, Sand, Salt, Sea-Coal, Charcoal, Smallcoal, Oysters, Muscles* and *Cockles.*

Q. *What is the Standard for* Dry Measure?

A. The Standard for Dry Measure is a Winchester Bushel, being 18 Inches and a Half wide throughout, and 8 Inches deep. One Gallon of this Quantity is 286 Solid Inches and $\frac{2}{4}$, and consequently is less than an Ale Gallon by 13 solid Inches and $\frac{1}{5}$.

EXAM-

EXAMPLES.

Ch. bu.	p.		Qrs. bu.	p.		Ch. bu.	p.		Qrs. bu.	p.
17 11	3		14 7	2		27 10	1		36 7	3
16 10	2		16 1	1		17 12	2		43 6	2
19 11	1		19 3	2		24 21	1		22 3	3
17 12	3		16 1	1		31 32	2		37 3	2
16 19	3		17 3	2		71 19	1		26 5	2
17 11	1		16 1	1		16 12	2		28 4	3
17 11	3		12 3	1		17 31	3		33 7	0
11 14	1		37 2	3		16 14	1		42 3	2

10. *Of* TIME.

Q. *Which are the Denominations of* Time ?
A. 60 Seconds, or *Sec.* —— make 1 Minute, *Min.*
  60 Minutes —— —— —— 1 Hour, *Hr.*
  24 Hours —— —— —— 1 Day, *Da.*
   7 Days —— —— —— 1 Week, *Wk.*
   4 Weeks —— —— —— 1 Month, *Mo.*
  13 Months, 1 Day and 6 Hours, 1 common or Julian Year, *Yr.*

Q. *What is a* Solar Year ?
A. According to the best Computations, a Solar Year is 365 Days, 5 Hours, 48 Minutes, and 55 Seconds.

Q. *How is the Year divided by the* Calendar ?
A. No more Days than 30 hath th' Month of *September* ;
  The same may be said of *June, April, November* ;
  The rest of the Months are just 30 and one,
  Except that short Month *February* alone,
  Which to itself claimest just 8 and a Score,
  But in ev'ry Leap Year, we give it one more.

EXAMPLES.

M. w. d.			H. m. sec.			M. w. d.			D. h. m. sec.			
14	1	6	17	10	32	31	2	1	17	11	13	16
17	2	5	17	22	21	17	1	6	19	12	16	11
16	1	3	14	21	32	17	3	4	17	12	17	13
19	3	2	4	2	3	16	1	1	14	13	26	31
16	1	1	7	3	1	17	2	1	13	12	11	48
26	2	0	73	16	30	16	2	5	17	19	19	12
13	2	2	22	28	42	19	1	4	13	23	26	51

11. O

11. Of MOTION.

Q. *Which are the Denomination; of* Motion in the heavenly Bodies?

A.   60 Seconds, or ″ make 1 prime Minute, ′.
         60 Minutes ———— 1 Degree, °.
         30 Degrees ———— 1 Sign.
         12 Signs, or 360 Degrees, make the whole great Circle of the Zodiac.

EXAMPLES.

°	′	″		°	′	″		°	′	″
71	10	16		47	17	19		46	17	31
12	11	19		17	10	38		17	36	18
17	16	13		12	11	41		13	11	12
19	11	26		13	10	16		16	19	12
17	48	51		26	17	12		17	12	10
14	12	11		73	19	12		16	12	10
17	16	11		16	41	32		17	19	17
57	16	17		21	32	41		31	26	43

12. Of Things bought and ſold by the Tale.

Q. *Which are the Denominations of Thing; accounted by the Tale?*

A.   12 Particulars make — 1 Dozen.
     12 Dozen ———— 1 Groſs.
     12 Groſs or 144 Dozen 1 great Groſs.
            Examples are needleſs.

Queſtions to exerciſe ADDITION.

1. A Man was born in the Year 1702, I demand when he will be 57 Years of Age?

2. There are two Numbers whoſe Difference is 17, and the leſſer Number is 44; what is the greater Number?

3. A Man borrowed a Sum of Mony, and paid in Part 12 *l.* 10 *s.* and the Remainder is 17 *l.* 10 *s.* I demand the Sum borrowed?

4. *A* owes me three Guineas, *B* 50 *l.* 12 *s.* *C* 104 *l.* *D* three ſcore and ſeventeen Pounds; How much is due to me in all?

5. *A, B,* and *C,* bought a Parcel of Goods, in the Purchaſe of which *A* laid out 3 *l.* *B* 40 *s.* and *C* 20 *d.* How much was laid out in all?

6. A Man

6. A Man hath 6 Bags of Hops; the firft weighs 2 *qrs.*
14 *lb.* and each of the reft weighs 14 *lb.* more : What Quantity hath he in the Whole?

7. A Man took an Houfe for 12 Years; and by Agreement
was to pay 100*l.* 10*s.* down; 190*l.* 4*s.* at the End of 6
Years; and 109*l.* 6*s.* at the End of 12 Years. I demand
the whole Sum?

8. A Shopkeeper having opened a Shop, the firft Week fold
Goods to the Value of threefcore Pounds, the next Week he
took fourfcore Pounds, but the third Week he took no more
than thirty Shillings; How much did he receive in all?

Of SUBTRACTION.

Q. **W**HAT *is the Ufe of* Subtraction?
    A. By taking a *lefs Number* from a *greater*, it
fhews the *Difference* between both.

Q. *How many forts of* Subtraction *are there?*
A. Two : *Simple* and *Compound.*

Of Simple SUBTRACTION.

Q. *What is* Simple Subtraction?
A. Simple or *Single Subtraction* is the finding a Difference
between any two Numbers, whofe Signification is the fame;
as the Difference between 6 Yards and 4 Yards, is 2 Yards.

Q. *How are Numbers to be placed in* Subtraction?
A. With *Units* under *Units, Tens* under *Tens,* &c. as in
Addition.

Q. *What Rule have you for the Operation of* Subtraction in
general?
A. When the lower *Number* is greater than the upper, take
the lower *Number* from the *Number* which you borrow, and to
that Difference add the upper *Number,* carrying one to the
next lower Place.

Q. *What* Number *muft you borrow, when the lower* Number
is greater?
A. The fame which you ftop at in *Addition.*

Q. *How do you prove* Subtraction?
A. By adding the Remainder and the leffer Line together,
which will always be equal to the greater Line. Or,

By fubtracting the Remainder from the greater Line, and
that Difference will always be equal to the leffer Line.

E X A M-

EXAMPLES.

	£	Yards.	Miles.	Days.	Months.
From	763	7694	41372	761214	7613471
Take	122	1867	13976	121812	2813126
Diff.					

	Hours.	lb.	Crowns.	Shillings.
From	31261812	312617127	71161871	7612641
Take	19879428	173121712	26571014	5910917
Diff.				

Of Compound SUBTRACTION.

Q. What is Compound Subtraction ?

A. Compound Subtraction produces a Difference between any two Sums of divers Denominations.

I. Of MONY.

EXAMPLES.

	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
From	14	10	6½	36	12	6½	76	12	6¾	31	18	4½
Take	3	17	8½	17	12	2¼	17	13	3¼	16	19	1
Diff.												

	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
Borr.	41	15	3	76	3	4½	73	7	6	17	12	1½
Paid	14	17	1½	13	17	7	19	4	1½	14	7	2

	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
Lent	136	11	6¼	47	17	6	413	11	7¾	71	18	9
Rec.	76	12	7¾	29	11	6¼	171	18	9½	17	16	10¾
Due												

Borrowed

	£	s.	d.			£	s.	d.
Borrowed	764	0	0	*Lent*		800	10	6

Paid at ſeveral Times	£	s.	d.	*Received at ſeveral Times*	£	s.	d.
	13	1	1½		12	11	2¼
	17	4	2		19	12	6
	16	1	6¾		17	11	2½
	24	2	1		14	11	3
	19	11	10		19	12	2
	26	13	5¼		14	11	8¾
	11	19	6¾		17	16	2¼
	13	12	2½		46	12	7¾

Paid in all   *Received in all*

Unpaid   *Remains due*

2. TROY-WEIGHT.

	Oz. dwt. gr.	Oz. dwt. gr.	Oz. dwt. gr.	lb. oz. dwt. gr.
From	71 11 12	71 12 18	13 16 12	84 4 11 12
Take	2 10 19	10 4 19	5 19 14	17 10 11 7
Diff.				

3 AVOIRDUPOIS-WEIGHT.

	C. qrs. lb.	lb. oz. dr.	lb. oz. dr.	T. C. qrs. lb.
Pou.	72 1 18	17 2 1	17 10 1●	12 1 2 10
Sold	3 1 26	10 13 2	15 14 3	5 3 1 19
Unsold				

4. APOTHECARIES-WEIGHT.

	℥. ʒ. ℈. gr.	℥. ʒ. ℈. gr.	lb. ℥. ʒ. ℈. gr.
From	65 4 2 10	47 5 1 16	48 2 2 0 19
Take	7 7 2 12	2 1 2 18	10 1 2 2 17
Diff.			

5. LONG

5. LONG MEASURE.

	Le.	m.	f.	p.		Yd.	f.	in.	b.c.		Le.	m.	f.	p.
From	71	1	3	10		48	0	1	2		61	0	1	3
Take	14	2	5	16		12	0	3	1		17	1	2	20
Diff.														

6. CLOTH-MEASURE.

	Yd.	qr.	na.		E.F.	qr.	na.			Yds.	qr.	na.
Bou.	71	3	1		51	2	2	A Draper bought		148	0	0
Sold	14	2	3		16	1	3					
Unfold												

Sold at feveral Times.
$$\left\{\begin{array}{ccc} 14 & 1 & 2 \\ 17 & 3 & 3 \\ 19 & 1 & 2 \\ 16 & 2 & 1 \\ 17 & 3 & 3 \end{array}\right.$$

	Yds.	qr.	na.		E.E.	qr.	na.
From	47	2	1		17	2	2
Take	12	1	3		14	4	3
Diff,							

Sold in all

Unfold

7. LAND-MEASURE.

	A.	r.	p.		A.	r.	p.		A.	r.	p.		A.	r.	p.
Bought	12	1	10		17	3	17		28	1	7		32	0	9
Tilled	5	3	17		12	3	23		19	1	28		16	2	23
Untilled															

8. WINE-MEASURE.

	T.	hds.	gal.		T.	hds.	gal.		Gals.	qts.	pts.		Gals.	qts.	pts.
From	3	2	10		7	2	10		19	2	1		67	1	1
Take	1	3	19		1	2	28		12	1	1		12	3	0
Diff.															

9. WINCHESTER-

9. WINCHESTER-MEASURE.

Hbds.gal.qts.	A.B. f. gal.	B.B. f. gals.	Hds.gal.qts.
Bou. 17 10 1	17 2 1	48 1 3	41 2 2
Sold 12 11 2	14 1 3	17 1 7	23 3 3

10. DRY MEASURE.

Ch. bu. p.	Ch. bu. p.	Qrs. bu. p.	Qrs. bu. p.
From 17 2 1	40 1 2	19 1 1	26 1 3
Take 10 1 3	16 5 1	12 7 2	19 1 2

11. TIME.

D. h. m. fec.	W. d. h. m. fec.	W. d. h. m. fec.
From 41 13 22 12	14 1 10 12 10	17 1 10 12 10
Take 22 16 33 31	10 3 19 48 26	10 2 14 6 15

12. MOTION.

° ′ ″	° ′ ″	° ′ ″
From 48 10 12	47 2 10	62 13 9
Take 19 11 16	12 19 46	49 18 33

Queftions to exercife SUBTRACTION.

1. A Man was born in the Year 1702; I demand his Age in the Year 1767?

2. There are two Numbers, the greater Number is 61, and the leffer Number is 44; I demand the Difference?

3. There are two Numbers, whofe Difference is 17 and the greater Number of 61; I demand the leffer Number?

4. The Brewer and the Baker drew Bills each upon the other: the Brewer ftands indebted 45 *l.* 19 *s.* and the Baker 26 *l.* and 7 *d.* ¼; who is the proper Perfon indebted, and how much?

C   5. A Man

5. A Man borrowed 30*l.* and paid in Part 12*l.* 10*s.* I demand how much remains unpaid?

6. King *Charles* the Martyr, was beheaded in the Year 1648; how many Years is it since?

7. *A* is indebted to the Brewer the Sum of 109*l.* 10*s.* *B* owes him 94*l.* 4*s.* 10*d.*½, how much does one owe more than the other?

8. What Sum is that, which taken from 100*l.* leaves 48*l.* 7*s.* 6*d.*½.

9. There were 4 Bags of Mony, containing as follows, *viz.* The first Bag 34*l.* the second Bag 50*l.* the third Bag 100*l.* and the fourth Bag 150*l.* which were to be paid to several Persons; but one of the Bags being lost, there were but 234*l.* paid; I demand which Bag was wanting?

Of MULTIPLICATION.

Q. WHAT is Multiplication?

A. It is a short Way of performing several *Additions.*

Q. *How many Parts are there in* Multiplication?

A. Three, *viz.*

1. The *Multiplicand*, or Sum to be multiplied.

2. The *Multiplier*, or Sum multiplied by.

3. The *Product*, or Total of the *Multiplicand*, as often as there are Units in the *Multiplier.*

Note, *The* Multiplicand *and the* Multiplier, *are also called* Factors; *and the* Product, *the* Fact *or* Rectangle.

Q. *How many forts of* Multiplication *are there?*

A. Two, *viz. Simple and Compound.*

Of Simple MULTIPLICATION.

Q. *What is* Simple Multiplication?

A. *Simple Multiplication* is the multiplying of any two Numbers together, without respect to their Signification; as 7 times 8 is 56.

Note 1. *As Addition and Subtraction of Integers are called* Simple Addition *and* Simple Subtraction; *fo should Multiplication and Division of Integers be called* Simple Multiplication *and* Simple Division; *and that only should be called* Compound Multiplication *and* Compound Division, *which hath Numbers of divers Denominations to be either multiplied, or divided.*

2. *The following Table must be learned perfectly by Heart, before you can proceed any further.*

The

The MULTIPLICATION TABLE.

3 times	3	is	9	5 times	6	is	30	11 times	3	is	33
	4		12		7		35		4		44
	5		15		8		40		5		55
	6		18		9		45		6		66
	7		21	6 times	6		36		7		77
	8		24		7		42		8		88
	9		27		8		48		9		99
4 times	4		16		9		54	12 times	3		36
	5		20	7 times	7		49		4		48
	6		24		8		56		5		60
	7		28		9		63		6		72
	8		32	8 times	8		64		7		84
	9		36		9		72		8		96
5 times	5		25	9 times	9		81		9		108

CASE I.

Q. *What do you obſerve in the* firſt Caſe *of* Multiplication ?
A. That the Factors be placed one under another, in ſuch manner, that Units may ſtand under Units, Tens under Tens, &c. and then multiply as the Table directs.

EXAMPLES.

£.	Crowns.	Days.	Hours.
47613127	47613174	71261812	71261312
2	3	4	5
95226254			

Minutes.	Years.	Gallons.	Ounces.
73126184	71312674	31261267	47612312
6	7	8	9

Shillings.	Yards.	Buſhels.	El's.
31261731	76138126	82365243	65423789
11	12	11	12

C 2   CASE

C A S E 2.

Q. *What do you obſerve in the* ſecond Caſe *of* Multiplication ?

A. 1. When the *Multiplier* conſiſts of more Figures than one, there muſt be made as many ſeveral *Products,* as there are Figures contained in the *Multiplier.*

2. Let the firſt Figure of every *Product* be placed exactly under its *Multiplier.*

3. Add theſe Products together, and their Sum will be the total *Product.*

Q. *How do you prove* Multiplication ?

A. Multiplication and *Diviſion* do mutually prove each other ; yet *Multiplication* may as truly be proved by itſelf, by inverting the Factors.

E x a m p l e s.

Crowns.	Days.	Weeks.	Pence.
691861	129186	281216	181281
26	98	979	763
17988386	12660228	275029248	138317403

Ounces.	Yards.	Pints.	Quarts.
269181	261986	812617	281691
4629	7638	43859	76286
1246038849	2001049068	35640569003	21489079626

Q. *What* Exceptions *have you to this* Caſe ?

A. 1. When theſe Figures 1 and 1, or 1 and 2, happen together in the Multiplier, you may multiply by both at once ; as in Caſe 1.

E x a m p l e s.

Weeks.	Buſhels.	Grains.	Leagues.
761312	671612	963458	843126
412	114	912	119
313660544	76563768	878673696	100331994

2. When any other Number between 12 and 20 happens, as 13, 14, 15, &c. then multiply by the Figures in Units Place, and as you multiply, add to the Product of each ſingle Figure that of the Multiplicand, which ſtands next on the right Hand.

E x a m-

E X A M P L E s.

Gallons.	Days.	Months.	lb.
4721217	4713176	4631261	4713761
15	16	17	18

C A S E 3.

Q: *What do you obferve in the* third *Cafe of* Multiplication ?
A. 1. Such *Factors* as have *Cyphers* at the Ends, muft be fet one under another, as if there were no *Cyphers*.

2. The *Cyphers* placed at the End of either, or both of the *Factors*, are to be omitted till the laft Product, and then the fame Number of *Cyphers* muft be annexed to it.

E X A M P L E s.

Pence.	Hours.	Years.
476000	180120	461210
170	48100	81900
80920000	8663772000	37773099006

Nails.	Inches.	Barrels.
760000	461200	618010
4800	72000	74210
3648000000	33206400000	45862522100

C A S E 4.

Q. *What do you obferve in the* fourth *Cafe of* Multiplication ?
A. When *Cyphers* are placed between the fignificant *Figures* in the *Multiplier*, they muft be omitted in the Operation : Regard being had to the firft Figure of every particular *Product* as before.

E X A M P L E s.

Gallons.	Eggs.	Buttons.
128121	128128	246145
72001	70043	60012
9224840121	8974469504	14771653740

C 3

CASE 5.

Q. *How do you multiply by the* Parts *of any Nnmber inftead of the* Whole?

A. When the *Multiplier* is fuch a Number, that any two Figures being multiplied together, will make the faid *Multiplier,* it is fhorter to multiply the given Number by one of thofe Figures, and that Product by the other; as 5 times 7 is 35.

EXAMPLES

Pounds.	Men.	Soldiers.	Sailors.
764126	764131	461231	461312
35	48	72	36
26744410	36678288	33208632	16607232

Of Compound MULTIPLICATION.

Q. *What is* Compound Multiplication?

A. When feveral Numbers of divers Denominations are given to be multiplied by one common *Multiplier*; this is called *Compound Multiplication.*

£ s. d.	lb. oz. dwt.gr.	C. qrs. lb.	lb. oz. dr.
17 3 1¼	17 5 12 16	43 1 14	17 12 10
2	3	4	5

M. f. p.	Yds. f. in. b.c.	Yds. qrs. na.	B.B. fir. gal.
16 4 21	17 2 3 1	16 3 2	17 2 3
6	7	8	9

Ch. b. p.	M. w. d.	D. h. m. fec.	o ′ ″
16 12 3	16 3 4	17 14 14 15	16 11 13
10	11	12	7

Note, *If the Learner be taught to turn back to the Bills of Parcels in* Addition, *be will find Plenty of Examples in* Compound Multiplication.

Queftions

Queftions to exercife MULTIPLICATION.

1. If one Man's Pay be 3*s.* what muft 40 Men have?
2. What is the Product of 76, multiplied by 3 and by 7?
3. There are 124 Men employed to finifh a Piece of Work, and they are to have 3*l.* each Man; I demand how much they muft all have?
4. An Army of 10000 Men having plundered a City, took fo much Mony, that when it was fhar'd among them, each Man had 27*l.* I demand how much Mony was taken in all?
5. There were 40 Men concern'd in the Payment of a Sum of Mony, and each Man paid 1271*l* how much was paid in all?
6. If one Foot contains 12 Inches, I demand how many Inches there are in 126 Feet?
7. What is the Product of 769 multiplied by 9 and by 7?

Of DIVISION.

Q. **W**HAT *is* Divifion?
   A. It is a fhort Way of performing feveral *Sub-tractions,* and fhews how oft one Number is contained in another, and what remains.

Q. *How many Parts are there in* Divifion?
A. Four, *viz.*

1 The *Dividend,* or Sum to be divided.
2. The *Divifor,* or Sum divided by.
3. The *Quotient,* or Anfwer to the Queftion.
4. The *Remainder,* which is always lefs than the *Divifor,* and of the fame Name with the *Dividend.*

Note, *The* Divifor, Dividend, *and* Quotient *are certain; but the* Remainder *is uncertain, becaufe fome Operations in* Divifion *have no Remainder.*

Q. *How many forts of* Divifion *are there?*
A. Two; *Simple* and *Compound.*

Of Simple DIVISION.

Q. *What is* Simple Divifion?
A. Simple Divifion is, when the *Divifor* and *Dividend* are made choice of, without any Regard to their Signification; as 56 divided by 7 gives 8 for the Quotient; or, the Number 7 is contained in 56, eight times.

Q. *How many forts of* Simple Divifion *are there?*
A. Two, *Short Divifion* and *Long Divifion.*

Of Short DIVISION.

Q. *What is* Short Divifion?
A. Short Divifion is, when the *Divifer* does not exceed 12.

C 4   EXAM-

EXAMPLES.

Minutes.	Months.	Days.
2)71313674(	6)312610841(	11)7312613107(
3)42310812(	7)713126719(	12)3812617314(
4)13812612(	8)701267131(	11)1612798131(
5)61231281(	9)126713103(	12)1731261712(

Q. *How is* Division *proved?*

A. multiply the *Divisor* and *Quotient* together, and the *Remainder* (if there be any) add to the Product; that Sum will be equal to the *Dividend.*

Of *Long* DIVISION.
CASE I.

Q. *What is* Long Division?

A When the *Divisor* is more than 12, for help of the Memory, we are obliged to multiply the *Quotient* Figure and *Divisor* together, and subtract that Product from the *Dividend*, in order to find out the *Remainder*; which Operation must be continued to every *Quotient* Figure: And this is called *Long Division.*

EXAMPLES.

Yards.	Shillings.	Pence.
91)71265871(	28)71261714(	1217)31917312(
82)31712617(	19)73126171(	3164)12697126(
73)17312618(	381)13261714(	6128)71217312(
64)47312617(	773)31746173(	2912)47161231(
55)73181061(	937)13189714(	33108)91261814(
46)76131714(	761)12816171(	71216)17131716(
37)31231712(	7618)18917312(	86257)34175362(

CASE 2.

Q. *What do you observe of* Cyphers *placed at the End of the* Divisor?

A They must be cut off; and the same Places also must be cut off in the *Dividend.*

2. Those Figures which are cut off in the *Dividend*, must be annexed to the *Remainder* at last,

EXAMPLES.

Yards.	Crowns.
625|00)712613|12(	128|000)71126|071(
426|00)713121|74(	412|000)71613|181(

CASE

C A S E 3.

Q. *How do you divide by the Parts of any Number inſtead of the* Whole ?

A. When the *Diviſor* is ſuch a Number that any two Figures being multiplied together, will make the ſaid *Diviſor*, it is ſhorter to divide the given Number by one of thoſe Figures, and that *Quotient* by the other; as 5 times 7 is 35.

E X A M P L E S.

Pence.	Crowns.	Pounds.
35)26744410(	48)36678288(	72)33208652(

Of Compound D I V I S I O N.

Q. *What is* Compound Diviſion ?

A. When ſeveral Numbers of divers Denominations are given to be divided by one common *Diviſor*; this is called *Compound Diviſion.*

E X A M P L E S.

l.	s.	d.		lb.	oz.	dwt. gr.		T.	C.	qr.	lb.
2)48	12	6½(		3)14	10	3 16(		4)17	1	1 14(	

lb.	oz.	dr.		M.	f.	p.		Yds.	f.	in.	b.c.
5)46	12	10(		6)33	2	14(		7)46	0	10	2(

Yds.	qr.	na.		A.B	fir.	gal.		Ch.	bu.	p.	
8)16	2	2)		9)17	3	2(		10)20	13	2(	

M.	w.	d.		D.	h.	m.	sec.		o.	′.	″.
11)48	2	2(		12)46	16	12	30(		12)33	4	11(

Queſtions to exerciſe D I V I S I O N.

1. If 140 s. be divided amongſt 40 Men, how much a-piece?

2. If 1596 be divided by 21, what is the Quotient?

3. There are 124 Men who have 372 l. among them, how much muſt each Man have?

4. An Army of 10000 Men having plundered a City, took 2666000 l. how much muſt each Man have?

5. There was a certain Number of Men concern'd in the Payment of 1272 l. and each Man paid 3 l. I demand the Number of Men?

6. What is the Quotient of 48447, divided by 9 and by 7?

7. If 3264 be divided by 12 and by 4, what is the Quotient?

8. A certain Man intending to go a Journey of about 3264 Miles, would compleat the ſame in 136 Days; I demand how many Miles he muſt travel each Day?

C 5

Of

Of REDUCTION.

Q. **W**HAT *is* Reduction?

  A. Reduction is the bringing or reducing Numbers of one Denomination into other Numbers of another Denomination, but of the fame Value.

 Q. *How are Denominations of any kind reduc'd from one to another?*

 A. By *Multiplication* and *Divifion.*

 Q. *When is* Multiplication *to be ufed?*

 A. When great Names are to be brought into fmall; as *Pounds* into *Shillings,* or *Days* into *Hours;* and this is called *Reduction Defcending.*

 Q. *When is* Divifion *to be ufed?*

 A. When fmall Names are to be brought into great; as *Shillings* into *Pounds,* or *Hours* into *Days;* and this is called (though improperly) *Reduction Afcending.*

 Note, *Whether you multiply or divide, it muft be by as many of the lefs, as* make one of the *greater Denomination.*

 Q. *How are Queftions in* Reduction *proved?*

 A. By varying the Order of them.

Of MONY.

REDUCTION *Defcending.*

 1. In 46*l.* how many *Shillings* and *Pence? Anfw.* 920 *s.* 11040 *d.*

$$46 l.$$
$$20$$
$$\overline{}$$
$$920 s.$$
$$12$$
$$\overline{}$$
$$11040 d.$$

 2. In 7*l.* how many *Shillings* and *Pence? Anfw.* 140 *s.* 1680 *d.*

 3. In 9*l.* how many *Shillings, Pence* and *Farthings? Anfw.* 180 *s.* 2160 *d.* 8640 *qrs.*

 4. In 7*l.* 14 *s.* 6 *d.* ¼, how many *Farthings? Anfw.* 7417 *qrs.*

 5. Reduce 46*l.* 14 *s.* 9 *d.* ¾ into *qrs. Facit* 44871 *qrs.*

 6. Reduce 50*l.* 9 *s.* 9 *d.* ½, into *Half-pence? Facit* 24235 *Half-pence.*

 7. Reduce 160*l.* 15 *s.* 6 *d.* into *Six-pences. Facit* 6431 *Six-pences.*

               8. Reduce

8. Reduce 48 *l.* 12 *s.* 8 *d.* into *Groats.* *Facit* 2918 *Groats.*

9. Reduce 90 *l.* 17 *s.* 6 *d.* into *Two-pences.* *Facit* 10905 *Two-pences.*

10. In 12 *Crowns,* how many *Shillings* and *Pence?* *Anfw.* 60 *s.* 720 *d.*

11. In 15 *l.* how many *Crowns* and *Shillings?* *Anfw.* 60 *Cr.* 300 *s.*

12. In 50 *Half Crowns,* how many *Pence* and *Farthings?* *Anfw.* 1500 *d.* 6000 *qrs.*

13. In 306 *Crowns,* how many *Half-Crowns* and *Pence?* *Anfw.* 612 *Half-Cr.* 18360 *d.*

14. Reduce 120 *Six-pences,* into *Three-pences, Pence,* and *Farthings.* *Facit* 240 *Three-pences,* 720 *d.* 2880 *qrs.*

15. Reduce 210 *Crowns,* into *Shillings, Groats* and *Pence, Facit* 1050 *s.* 3150 *Groats,* 12600 *d.*

16. Reduce 86 *Pounds* into *Crowns, Shillings* and *Groat s, Facit* 344 *Cr.* 1720 *s.* 5160 *Groats.*

17. How many *Shillings* and *Pence* are in 17 *Guineas?* *Anfw.* 357 *s.* 4284 *d.*

18. How many *Crowns* and *Six-pences* are in 28 *Pounds?* *Anfw.* 112 *Crowns,* 1120 *Six-pences.*

REDUCTION *Afcending.*

1. In 11040 *d.* how many *Shillings* and *Pounds?* *Anfw.* 920 *s.* 46 *l.*

$$\frac{2|0}{12)11040(92|0(46l.}$$

2. In 1680 *d.* how many *Shillings* and *Pounds?* *Anfw.* 140 *s.* 7 *l.*

3. In 8640 *qrs.* how many *Pence, Shillings* and *Pounds?* *Anfw.* 2160 *d.* 180 *s.* 9 *l.*

4. In 7417 *qrs.* how many *Pounds?* *Anfw.* 7 *l.* 14 *s.* 6 *d.*$\frac{1}{4}$.

5. Reduce 44871 *qrs.* into *Pounds.* *Facit* 46 *l.* 14 *s.* 9 *d.* $\frac{3}{4}$.

6. Reduce 24235 *Half-pence* into *Pounds.* *Facit* 50 *l.* 9 *s.* 9 *d.* $\frac{1}{4}$.

7. Reduce 6431 *Six-pences* into *Pounds.* *Facit* 160 *l.* 15 *s.* 6 *d.*

8. Reduce 2918 *Groats* into *Pounds.* *Facit* 48 *l.* 12 *s.* 8 *d.*

9. Reduce 10905 *Two-pences* into *Pounds.* *Facit* 90 *l.* 17 *s.* 6 *d.*

10. In 720 *d.* how many *Shillings* and *Crowns?* *Anfw.* 60 *s.* 12 *Cr.*

11. In 300 *s.* how many *Crowns* and *Pounds?* *Anfw.* 60 *Cr.* 15 *l.*

12. In 6000 *qrs.* how many *Pence* and *Half Crowns?* *Anfw.* 1500 *d.* 50 *Half-Crowns.*

13. In

13 I 18360 *l.* how many *Half-Crowns* and *Crowns? Anfw.*
612 *Half Cr.* 306 *Cr.*

14. Reduce 2880 *qrs.* into *Pence, Three pences* and *Six-pences.*
Facit 720 *d.* 240 *Three-pence*, 120 *Six-pences.*

15. Reduce 12600 *d.* into *Groats, Shillings* and *Crowns.*
Facit 3150 *Gr.* 1050 *s.* 210 *Cr.*

16. Reduce 5160 *Groats* into *Shillings, Crowns* and *Pounds.*
Facit 1720 *s.* 344 *Cr.* 86 *l.*

17. How many *Shillings* and *Guineas* are in 4284 *Pence?*
Anfw. 357 *s.* 17 *Guineas.*

18. How many *Crowns* and *Pounds* are in 1120 *Six-pences?*
Anfw. 112 *Cr.* 28 *l.*

REDUCTION *Afcending and Defcending.*

1. In 720 *Shillings,* how many *Pence* and *Crowns? Anfw*
8640 *d.* 144 *Crowns.*

$$720 \, s.$$
$$12$$
───────
6|0)864|0(144 *Crowns.*

2. In 120 *Shillings,* how many *Crowns* and *Half-Crowns?*
Anfw. 24 *Cr.* 48 *Half-Cr.*

3. In 60 *Crowns,* how many *Shillings* and *Pounds? Anfw.*
300 *s.* 15 *l.*

4. In 612 *Half-Crowns,* how many *Crowns* and *Pence?*
Anfw. 360 *Cr.* 18360 *d.*

5. In 40 *Guineas,* how many *Shillings, Crowns* and *Pounds?*
Anfw. 840 *s.* 168 *Cr.* 42 *l.*

6. Reduce 12600 *Pence* into *Shillings, Groats* and *Crowns.*
Facit 1050 *s.* 3150 *Gr.* 210 *Cr.*

7. Reduce 63 *Crowns* into *Shillings* and *Guineas. Facit*
315 *s.* 15 *Guineas.*

8. Reduce 70 *Moidores* into *Pounds. Facit* 94 *l.* 10 *s.*

9. Reduce 12180 *Three-pences* into *Shillings, Pence* and
Groats. Facit 3045 *s.* 36540 *d.* 9135 *Gr.*

10. How many *Crowns, Groats* and *Pounds,* are in 1720 *s.?*
Anfw. 344 *Cr.* 5160 *Gr.* 86 *l.*

11. How many *Groats, Three-pences* and *Six-pences* are in
121 *Shillings? Anfw.* 363 *Gr.* 484 *Three-pences,* 242 *Six-*
pences.

12. How many *Pounds* and *Crowns* are in 1120 *Six-pences?*
Anfw. 28 *lb.* 112 *Cr.*

13. How many *Crowns, Half-Crowns* and *Shillings* are in
280 *l.* and the Number of each equal ? *Anfw.* 658, and 7 *s.*
over.   14. Four

14. Four Men brought each 17 *l.* 10 *s.* Value in Gold into the Mint to be coined into *Guineas,* how many muft they have? *Anfw.* 66 *Guineas,* 14 *s.*

15. There are 12 Purfes with each 12 *Guineas,* how much *Sterling* is the Sum? *Anfw.* 151 *l.* 4 *s.*

16. A certain Ground Tenant was behind with his Landlord for 16 Years Rent, at 5 *l.* 10 *s.* a Year, how much was the Debt? *Anfw.* 88 *l.*

17. There are 34 *l.* 17 *s.* to be divided among 17 Men, how much is it a-piece? *Anfw.* 2 *l.* 1 *s.*

18. In 19 *Moidores,* how many *Pounds Sterling? Anfw.* 25 *l.* 13 *s.*

Of TROY-WEIGHT.

1. In 47 *lb.* 10 *oz.* how many G ains? *Anfw.* 275520 *gr.*

2. In 47128 Grains of Gold, how many *lb. ? Anfw.* 8 *lb.* 2 *oz.* 3 *dwts.* 16 *gr.*

3. In 10 *lb.* of Silver, how many Spoons, each 5 *oz.* 10 *dwts. Anfw.* 21 *Spoons,* and 90 *dwts.* over.

4. In 4560 Grains of Gold, how many Tea-Spoons, each half an Ounce? *Anfw.* 19 *Tea-Spoons.*

5. In 47 Salvers, each 20 *oz.* how many *lb. ? Anfw.* 78 *lb.* 4 *oz.*

6. How many Porringers, each 11 *oz.* are in 19 *lb.* 10 *oz.* 11 *dwts.* of Silver? *Anfw.* 21 *Porringers,* and 151 *dwts.* over.

7. A Goldfmith having 3 Ingots of Silver, each weighing 27 *oz.* was minded to make them into Spoons of 2 *oz.* Cups of 5 *oz.* Salts of 1 *oz.* and Snuff-boxes of 2 *oz.* and to have an equal Number of each; the Queftion is, what was that Number? *Anfw.* 8 of each Sort, and 1 *oz* over.

8. In 17 Ingots of Silver, each 27 *oz.* 10 *dwts.* how many Grains? *Anfw.* 224400 *gr.*

Of AVOIRDUPOIS-WEIGHT.

Q *Which are the* Allowances *ufually made in* Avoirdupois *great weight to the Buyer?*

A. They are *Tare, Trett,* and *Cloff.*

Q *What is* Tare?

A. Tare is an Allowance made to the *Buyer,* for the Weight of the *Box, Bag, Veffel,* or whatever elfe contains the Goods bought; and is either,——

1. At fo much *per Bag, Barrel, Box,* &c.

2. At fo much *per Cent.* or

3. At fo much in the *Grofs* Weight, called *Invoice* Tare.

Q *What*

Q. *What is* Trett?

A. *Trett* is an Allowance, made by the Merchant to the Buyer, of 4*lb.* in 104*lb.* that is, the six and twentieth Part for Waste and Dust, in some sort of Goods.

> Note 1, *If an Allowance be made both for* Tare *and* Trett, *in the same Parcel of Goods, the* Tare *is first to be deducted; and that Remainder is called* suttle Weight.

Q. *What is* Cloff?

A. *Cloff* is an Allowance of 2*lb.* Weight to the Citizens of *London,* on every Draught above 3 C. Weight, on some sorts of Goods; as *Galls, Madder, Sumac, Argol,* &c.

Q. *What are these Allowances called beyond the Seas?*

A. They are called the *Courtesies of London;* because they are not practised in any other Place.

Q. *What is* Gross Weight?

A. *Gross* is the Weight of any Sort of Merchandize, and that which contains it, being weighed both together.

Q. *What is* Neat Weight?

A. *Neat* is the pure Weight of the Goods, after all Allowances are deducted.

> Note 1, Raw, Long, Short, China, Morea-Silk, &c. *are weighed by a great Pound of* 24 *oz.* But Ferret, Filoseila, Sleeve-Silk, &c. *by the common Pound of* 16 *oz.*
> 2. *To bring great Pounds into common, multiply by* 3, *and divide by* 2.
> 3. *To bring common Pounds into great, multiply by* 2, *and divide by* 3.

C A S E I.

E X A M P L E S.

1. In 7 C. 3 *qrs.* 10 *lb.* how many *Oz.* and *Drams? Answ.* 14048 *oz.* 224768 *dr.*

2. In 3 Tons of Iron, how many C. *qrs.* and *lb.?* *Answ.* 60 C. 240 *qrs.* 6720 *lb.*

3. In 14048 *oz.* how many C.? *Answ* 7 C. 3 *qrs.* 10 *lb.*

4. In 6720 *lb.* of Iron, how many Tons? *Answ.* 3 *Tons.*

5. In 461 great Pounds of Morea-Silk, how many *Oz.* and *Drams? Answ.* 11064 *oz.* 177024 *dr.*

6. In 40426 Drams of Silk, how many great Pounds? *Answ.* 105 *great Pounds,* 6 *oz.* 10 *dr.*

7. In 3 *lb.* of Cinnamon, how many Parcels, each 12 *oz.?* *Answ.* 4 *Parcels.*

8. In 470 Parcels of Sugar, each 26 *lb.* how many C.? *Answ.* 109 C. 0 *qrs.* 12 *lb.*

9. In

9. In 672 great Pounds of Silk, how many common Pounds? *Answ.* 1008 *common lb.*

10. In 480 common Pounds of Silk, how many great Pounds? *Answ.* 320 *great lb.*

11. In 8 Hogsheads of Tobacco, each weighing neat 7 $C.\frac{1}{2}$, how many Pounds? *Answ.* 6720 *lb.*

12. In 17 Pigs of Lead, each weighing 4 $C.\frac{3}{4}$, how many Fother, at 19 $C.\frac{1}{2}$? *Answ.* 4 *Fother,* 2 *C.* 3 *qrs.*

13. In 712 $C.$ of Lead, how many Fother? *Answ.* 36 *Fother,* 10 *C.*

14. In 17 $C.$ 1 *qr.* 6 *lb.* of Sugar, how many Parcels, each 17 *lb.*? *Answ.* 114 *Parcels.*

C A S E 2.

Of T A R E *and* T R E T T, *&c.*

Note, *If the Teacher approves of it, he may introduce this and the following Cases, after Practice instead of this Place.*

Q. *When the* Tare *is at so much* per Barrel, Bag, *&c. how is the* neat Weight *found?*

A. Multiply the Number of the said *Barrels, Bags,* &c. by the Tare, and subtract that Product from the *Gross*; the Remainder is the *Neat.*

Note 1, *The Table of Allowance for Tare, in the Book of Rates, says; For* CYPRUS *and* SMYRNA *Silk.*

Bales $\left\{\begin{array}{l}\text{about or above 300}lb.\\ from\ 300\ to\ 200\\ from\ 200\ downwards.\end{array}\right\}$ $\begin{array}{l}\textit{The Tare}\\ \textit{per Bale is}\end{array}$ $\left\{\begin{array}{l}16\\14\\12\end{array}\right.$

For VIRGINIA *Tobacco.*

Hhds. $\left\{\begin{array}{l}5\ C.\ and\ upwards\\ from\ 5\ to\ 4\ C.\\ from\ 4\ to\ 3\ C.\\ under\ 3\ C.\end{array}\right\}$ $\begin{array}{l}\textit{The Tare per}\\ \textit{Hhd. is}\end{array}$ $\left\{\begin{array}{l}100\\90\\80\\70\end{array}\right.$

Sugar from INDIA.

In *Casks and Canisters*
In *Chests and Casks from* St. Thome. $\Big\}$ *Tare* $\left\{\begin{array}{l}\frac{1}{4}\\\frac{1}{3}\end{array}\right.$

Oil from CANDIA.
Tare 29 *lb.* per Barrel.

2. 7 *lb.* $\frac{1}{2}$ of Oil make a Gallon; therefore to reduce Pounds into Gallons multiply by 2, and divide by 15.

E X A M P L E S.

1. In 16 Hogsheads of Tobacco, each 5 $C.$ 1 *qr.* 19 *lb.* Gross, Tare *per* Hogshead 100 *lb.* how much Neat Weight? *Answ.* 72 $C.$ 1 *qr.* 20 *lb.*

C.

```
                                    C.  qr.  lb.
                                    5   1   19
                                           4  by the Parts.
                                    ────────────
16                                  21  2   20
  100                                        4
  ─────4   C.  qr.  lb.              ────────────
28)1600(57(14   1   4         Groſs 86  2   24
                                Tare 14  1    4

                                    ────────────
                              Neat  72  .1   20
```

2. In 70 Bales of *Smyrna* Silk, each 317 *lb.* Groſs, Tare *per* Bale 16 *lb.* how many *lb.* Neat? *Anſw.* 21070 *lb. Neat.*

3. In 14 Hogſheads of Tobacco, weighing Groſs 89 *C.* 3 *qrs.* 17 *lb.* Tare *per* Hogſhead 100 *lb.* how much neat Weight? *Anſw.* 77 *C.* 1 *qr.* 17 *lb.*

4. What is the Neat Weight of 30 Bales of *Cyprus* Silk, each weighing 249 *lb.* Groſs, Tare *per* Bale 14 *lb.* ? *Anſw.* 7050 *lb.*

C A S E 3.

Q. When the Tare is at ſo much per Cent. how is the Neat Weight *found?*

A. When the *Tare* is an aliquot Part or Parts of the *C.* Weight, divide the whole Groſs by the ſaid Part or Parts that the Tare is of an *C.* Weight, and the Quotient thence ariſing, gives the Tare of the Whole; which ſubtract from the whole Groſs, the Remainder is *Neat.*

Note 1. *Figs, Almonds, Argol, &c.* - - - - - - - 14 *lb.*
      Caroteels, Butts of Currans, &c. - - - - 16   per Cent.
      Oil in uncertain Caſks, *&c.* - - - - - - 18

2. *Whatever Part the given Tare is of an C. Weight, the ſame muſt the whole* Tare *be of the given* Groſs Weight.

E X A M P L E S.

1. What is the neat Weight of 12 Barrels of Argol, Groſs 48 *C.* 3 *qrs.* 12 *lb.* Tare 14 *lb. per* Cent.? *Anſw.* 42 *C.* 3 *qrs.*

```
                      C.  qrs. lb.
        14=⅛)48   3   12 Groſs.
                   6   0   12 Tare.
                  ─────────────
                  42   3   0 Neat
```

2. In 12 Butts of Currans, each 7 *C.* 1 *qr.* 10 *lb.* Groſs. Tare *per Cent.* 16 *lb.* how much neat Weight? *Anſw.* 75 *C.* 1 *qr.* 26 *lb.* 14 *oz.*

3. What

3. What is the neat Weight of 30 Barrels of Figs, each 2 C. 3 *qrs.* Grofs, Tare *per Cent.* 14 *lb.* ? *Anfw.* 72 C. 21 *lb.*

Note, *When the Tare is not the aliquot Part or Parts of an C. Weight, then multiply the Pounds Grofs by the Tare per Cent. given, and that Product divide by 112, the Quotient is the whole Tare, which fubtract from the Grofs, the Remainder is neat.*

4. What is the Neat Produce of 20 Barrels of Anchovies, each Grofs 33 *lb.* Tare *per Cent.* 10 *lb* ? *Anfw.* 601 *lb.* 2 *oz.*

5. What is the neat Produce of 17 Barrels of Pot-Afh, each Grofs 203 *lb.* Tare 10 *lb. per Cent.* ? *Anfw.* 3142 *lb.* 14 *oz.*

C A S E 4.

Q. *When the Tare is at fo much in the whole* Grofs Weight; *how is the* Neat Weight *found?*

A. Subtract the *Tare* from the *Grofs,* and the *Remainder* is *Neat.*

E X A M P L E S.

1. What is the Neat Weight of 38 Hogfheads of Tobacco, weighing Grofs 201 C. 3 *qrs.* 12 *lb.* Tare in the Whole 3140 *lb.* ? *Anfw.* 173 C. 3 *qrs.* 8 *lb.*

2. What is the Neat Weight of 3 Hogfheads of Tobacco, weighing as follows, *viz.*

	C.	qrs.	lb.		lb.	
N° 1 —	3	1	2	Tare	80	
2 —	3	2	1		90	
3 —	5	1	12		100 ?	*Anfw.* 9 C. 3 *qrs.* 7 *lb.*

C A S E 5.

Q. *How is the* Neat Weight *found, when* Trett *is allowed with* Tare ?

A. Divide the *Pounds Suttle* by 26, the Quotient is the *Trett,* which fubtract from the *Suttle,* the Remainder is *Neat.*

E X A M P L E S.

1. In 8 C. 3 *qrs.* 20 *lb.* Grofs, Tare 38 *lb.* Trett 4 *lb. per* 104 *lb.* how many *lb.* Neat ? *Anfw.* 925 *lb.* Neat.

2. In 177 C. 0 *qrs.* 22 *lb.* Grofs, Tare 9 *lb. per Cent.* Trett 4 *lb. per* 104 *lb.* how many C. Weight Neat ? *Anfw.* 156 C. 2 *qrs.* 22 *lb.*

3. In 17 Chefts of Sugar, weighing 120 C. 2 *qrs.* Grofs, Tare 176 *lb.* Trett 4 *lb. per* 104 *lb.* how many C. Weight Neat ? *Anfw.* 114 C. 1 *qr.* 12 *lb.*

Note, *There are other Allowances, not fo common, fuch as Break, which is at fo much per Barrel, Bag, &c. and Damage, which is fo much in the Whole, but they are very eafy.*

Of APOTHECARIES-WEIGHT.

1. In 12 ℔. 1 ℥. 2 ʒ. 0 Ə. 1 gr. how many Grains ? *Anfw.* 69721 Grains. 2. In

2. In 69721 Grains, how many ℈. 3. ʒ. and ℔? *Anfw.*
12 ℔. 1 ʒ. 2 ʒ. 0 ℈. 1 gr.

Of LONG MEASURE.

1. In 70 Miles, how many Furlongs and Poles? *Anfw.*
560 *Furlongs*, 22400 *Poles.*

2. In 40 Yards, how many Feet, Inches and Barly-corns?
Anfw. 120 *Feet*, 1440 *Inches*, 4320 *Barly-corn:.*

3. In 5 Miles, how many Barly-corns? *Anfw.* 950400
Barly-corns.

4. In 4000 Inches how many Yards? *Anfw.* 111 *Yds.* 4 *In.*

5. In 4 Leagues, how many Yards? *Anfw.* 21120 *Yards.*

6. In 15840 Yards, how many Miles and Leagues? *Anfw.*
9 *Mile*, 3 *Leagues.*

7. How many Barly-corns in a Mile? *Anfw.* 190080 *Barly-
corns.*

8. How many Times doth the Wheel, which is 18 Feet
6 Inches round, turn between *London* and *York,* which is 150
Miles? *Anfw.* 42810 *times, and* 180 *Inches over.*

9. How many Barly-corns will reach round the Globe of
the Earth, which is 360 Degrees, and each Degree 69 Miles
and an Half? *Anfw.* 4755801600 *Barly-corns.*

Of CLOTH-MEASURE.

1. In 14 Yards, how many Quarters and Nails? *Anfw.*
56 *Qrs.* 224 *Nails.*

2. In 17 *Yds.* 1 qr. 2 na. how many Nails? *Anfw.* 278 na.

3. In 4712 Nails, how many Yards? *Anfw.* 224 *Yds.* 2 qrs.

4. In 47128 Nails of *Irifh* Cloth, how many Pieces, each
12 Yards? *Anfw.* 245 *Pieces*, 5 *Yards*, 2 *Quarters.*

5. In 4 Pieces of Cloth, each 14 Yards, how many Quar-
ters and Nails? *Anfw.* 224 *Qrs.* 896 *Nails.*

6. In 10 Bales of Cloth, each 10 Pieces, each 12 Yards,
how many Yards? *Anfw.* 1200 *Yards.*

7. In 7000 Nails of Holland, how many Ells? *Anfw.* 350 *Ells.*

8. Reduce 42 Ells into Quarters and Nails? *Facit* 210 *Qrs.*
840 *Nails.*

Of LAND-MEASURE.

1. In 40 Acres, how many Roods and Perches? *Anfw.*
160 *Roods*, 6400 *Perches.*

2. In 17 *A.* 3 r. 10 p. how many Perches? *Anfw.* 2850 *Pers.*

3. Reduce 2850 Perches into Acres. *Facit* 17 *A.* 3 r. 10 p.

4. If a Piece of Ground contains 24 Acres, and an Inclofure
of 17 Acres 3 Roods be taken out of it, how many Perches
are there in the Remainder? *Anfw.* 1000 *Perches.*

5. One

5. One Field contains 7 Acres, another 10 Acres, and a third 12 Acres 1 Rood, how many Shares of 76 Perches each are contained in the Whole? *Answ.* 61 *Shares, and* 44 *Perches over.*

Of LIQUID-MEASURE.

1. In 17 Gallons how many Quarts and Pints; *Answ.* 68 *Qts.* 136 *Pints.*

2. In 10 Barrels of Beer, how many Gallons and Quarts? *Answ.* 360 *Gals.* 1440 *qts.*

3. In 4 Barrels of Ale, how many Gallons? *Answ.* 128 *Gals.*

4. In 72 Hogsheads of Beer, how many Barrels? *Answ.* 108 *Barrels.*

5. In 91 Barrels of Beer, how many Hogsheads? *Answ.* 60 *Hhts.* 36 *Gals.*

6. If a Back contains 30 Barrels of Beer, how many Gallons doth it hold? *Answ.* 1080 *Gals.*

7. In 4 Tuns of Oil, how many Hogsheads, Gallons, and Quarts? *Answ.* 16 *Hhds.* 1008 *Gals.* 4032 *Quarts.*

8. In 3 Hogsheads of Brandy, how many half Anchors? *Answ.* 37 *half Anchors,* 4 *Gals.*

9. In 1712 Gallons of Wine, how many Hogsheads? *Answ.* 27 *Hhds.* 11 *Gals.*

10. If a Vintner be desirous to draw off a Pipe of Canary into Bottles, containing Pints, Quarts, and 2 Quarts, and of each an equal Number, how many must he have? *Answ.* 144 *of each sort.*

Of DRY MEASURE.

1. In 40 Quarters of Wheat, how many Bushels and Pecks? *Answ.* 320 *Bushels,* 1280 *Pecks.*

2. Reduce 1280 Pecks of Wheat into Quarters. *Facit* 40 *Qrs.*

3. In 30 Chaldron of Coals, each 36 Bushels, how many Pecks? *Answ.* 4320 *Pecks.*

4. Reduce 7094 Pecks of Coals into Chaldrons. *Facit* 49 *Chal.* 9 *Bush.* 2 *Pecks.*

Of TIME.

1. In 121812 Seconds, how many Hours? *Answ.* 33 *Hrs.* 50 *Min.* 12 *Sec.*

2. Reduce 41 Weeks into Days, Hours, and Minutes. *Facit* 287 *Days,* 6888 *Hrs.* 413280 *Min.*

3. Reduce 413280 Minutes into Weeks. *Facit* 41 *Weeks.*

4. How many Seconds in a Year, allowing it to be 365 Days, 6 Hours? *Answ* 31557600 *Seconds.*

5. How many Days have passed since the Birth of Christ, to Christmas, 1760? *Answ.* 642840 *Days.*

6. From

6. From *March* 2 to *November* 19 following (inclusive) how many Days? *Answ.* 263 *Days.*

Of MOTION.

1. In half a Year's Time the Sun makes his Progress thro' 6 Signs of the Zodiac, How many Degrees, Minutes, and Seconds doth that amount to? *Answ.* 180 *Degrees,* 10800 *Min.* 648000 *Sec.*

Of the SINGLE RULE of THREE.

Q. HOW *many Parts are there in the Rule of* Three?

A. Two: *Single* or *Simple,* and *Double* or *Compound.*

Q. *By what is the* Single Rule *of* Three *known?*

A. By *three Terms,* which are always given in the Question to find a *Fourth.*

Q. *Are any of the* Terms *given to be reduced from one* Denomination to another?

A. If any of the given *Terms* be of several *Denominations,* they must be reduced into the lowest *Denomination* mentioned.

Q. *What do you observe concerning the* first *and* third Terms?

A. They must be of the same Name and Kind.

Q. *What do you observe concerning the* fourth Term?

A. It must be of the same Name and Kind with the *Second.*

Q. *What do you observe of the three given* Terms *taken together?*

A. That the two first are a *Supposition,* the last is a *Demand.*

Q. *How is the* third Term *known?*

A. It is known by these, or the like Words, *What cost? How many? How much?*

Q. *How many sorts of* Proportion *are there?*

A. Two: *Direct* and *Inverse.*

1. Of DIRECT PROPORTION.

Q. *What is* direct Proportion?

A. Direct Proportion is when *more* requires *more,* or *less* requires *less.*

Q. *What do you mean by* more requires more?

A. More requires more is when the third Term is *greater* than the first; and therefore requires the fourth Term to be *greater* than the second in the same Proportion.

Q. *What do you mean by* less requires less?

A. Less requires less is when the third Term is less than the first; and therefore requires the fourth Term to be *less* than the second in the like Proportion.

Q. *How is the fourth* Term *in* Direct Proportion *found?*

A. By

A. By multiplying the second and third Terms together, and dividing that Product by the first Term.

Q. What Proportion does the fourth Number bear to any other ?
A. It bears the same Proportion to the Second, as the Third does to the First.

Q. How do you prove Questions in the Rule *of* Three Direct *?*
A. By changing their Order.

EXAMPLES.

1. If 3 *Oz.* of Silver cost 17*s.* what will 48 *Oz.* cost? *Answ.* 13 *l.* 12*s.*

$$
\begin{array}{ccc}
Oz. & s. & Oz. \\
3 : & 17 : : & 48 \\
& & 17 \\
\end{array}
$$

2|0 *l.* *s.*
3)816(27|2(13 12

2. If 3 *lb.* of Ginger cost 3 *s.* what cost 26 *lb.* ? *Answ.* 1*l.* 6*s.*
3. If 2 *oz.* of Silk cost 2 *s.* 6 *d.* what cost 7 *lb.* ? *Answ.* 7 *l.*
4. If 1 Gallon of Aie cost 8 *d.* what cost 36 Gallons ? *Answ.* 1 *l.* 4*s.*
5. If 1 *lb.* of Sugar cost 4 *d.* ½, what cost 48 *lb.* ? *Answ.* 18 *s.*
6. If 1 *lb.* of Sugar cost 4 *d.* what cost 1 *C.* ? *Answ.* 1*l.* 17*s.* 4*d.*
7. If an *C.* of Sugar cost 2 *l.* 12 *s.* what cost 1 *lb.* ? *Answ.* 5 *d.* 2 *qrs.* $\frac{32}{112}$.
8. If 1 Gallon of Beer cost 4 *d.* what cost a Barrel ? *Answ.* 12 *s.*
9. If 1 Pair of Stockings cost 2*s.* 3 *d.* what cost 19 Dozen Pair ? *Answ.* 25 *l.* 13*s.*
10. If 19 Dozen Pair of Shoes cost 25 *l.* 13 *s.* what cost 1 Pair ? *Answ.* 2 *s.* 3 *d.*
11. Bought a Firkin of Butter, containing 56 *lb.* for 18*s.* 8 *d.* what is that *per lb.* ? *Answ.* 4 *d.*
12. Sold 3 *C.* Weight of Tobacco, at 18 *d. per lb.* what is the Price of the Whole ? *Answ.* 25 *l.* 4 *s.*
13. Bought 19 Chaldron of Coals, at 29*s.* 6 *d. per* Chaldron, what come they to ? *Answ.* 28 *l.* 0 *s.* 6 *d.*
14. If 1 *lb.* of Sugar cost 9 *d.* what cost 17 *C.* 2 *qrs.* ? *Answ.* 73 *l.* 10 *s.*
15. If 1 *oz.* of Silver cost 5 *s.* 6 *d.* what is the Price of a Tankard that weighs 1 *lb.* 10 *oz.* 10 *dwts.* 4 *gr.* ? *Answ.* 6 *l.* 3 *s.* 9 *d.* 2 *qrs.* $\frac{96}{480}$.
16. If 1 *lb.* of Tobacco cost 15 *d.* what cost 3 *hhds.* weighing together 15 *C.* 1 *qr.* 19 *lb.* ? *Answ.* 107 *l.* 18 *s.* 9 *d.*
17. If a Yard of Cloth is worth 14 *s.* what is the Worth of 5 Pieces, each 19 Yards ? *Answ.* 66 *l.* 10 *s.*
18. If an Ell of Holland cost 4 *s.* 6 *d.* what is the Value of 5 Pieces, each 12 Ells ? *Answ.* 13 *l.* 10 *s.* 19. If

19. If a Bushel of Coals cost 10 *d.* how many Chaldron for 100 *l.*? *Answ.* 66 *Ch.* 24 *Bush.*

20. How many Quarters of Corn for 40 Guineas, at 4 *s.* *per* Bushel? *Answ.* 26 *Qrs.* 2 *Bush.*

21. If a Man's yearly Income be 300 *l.* what is it *per* Day? *Answ.* 16 *s.* 5 *d.* 1 *qr.* $\frac{15}{365}$.

22. If a Man spend 7 *Pence per* Day, how much is that in a Year? *Answ.* 10 *l.* 12 *s.* 11 *d.*

23. If a Pint of Wine cost 10 *d.* what cost 3 *hhds.*? *Answ.* 63 *l.*

24. If a Pipe of Canary cost 40 *l.* how much is that *per* Pint? *Answ.* 9 *d.* 2 *qrs.* $\frac{26}{1008}$.

25. Bought 12 Pieces of Cloth, each 12 Yards, at 10 *s.* 6 *d.* *per* Yard, what come they to? *Answ.* 75 *l.* 12 *s.*

26. What cost 120 Yards of Cloth, at 3 *s. per* Yard? *Answ.* 18 *l.*

27. A Merchant bought 4 Pieces of Holland, each 12 Ells, for 7 *l.* 10 *s.* what did 1 Ell cost? *Answ.* 3 *s.* 1 *d.* $\frac{1}{2}$.

28. A Grocer bought 3 *Hhds.* of Sugar, each 10 *C.* 3 *qrs.* 12 *lb.* Gross, Tare 26 *lb. per Hhd.* at 2 *d.* $\frac{1}{2}$ *per lb.* I demand what the 3 *hhds.* came to? *Answ.* 37 *l.* 3 *s.* 9 *d.*

29. How much must I pay for the Carriage of 10 *C.* $\frac{1}{2}$, at the Rate of 1 *d.* $\frac{1}{2}$ *per lb.*? *Answ.* 7 *l.* 7 *s.*

30. If 6 Horses eat up 21 Bushels of Oats in a Week's Time, how many Bushels will serve 20 Horses the same Time? *Answ.* 70 *Bush.*

31. If a Family of 10 Persons spend 3 Bushels of Malt in a Month, how many Bushels will serve them, when they are 30 in Family? *Answ.* 9 *Bush.*

32. If an Ingot of Silver weighs 36 *oz.* 10 *dwts.* what is it worth, at 5 *s. per oz.*? *Answ.* 9 *l.* 2 *s.* 6 *d.*

33. How many Yards of Lace for 100 *l.* at 3 *s.* 6 *d. per* Yard? *Answ.* 571 *Yds.* $\frac{13}{21}$.

34. If a Merchant hath owing to him 1000 *l.* and his Debtor doth agree to pay him for every Pound 12 *s.* 6 *d.* I demand how much he must pay in all? *Answ.* 625 *l.*

35. A Goldsmith sold a Tankard for 10 *l.* 12 *s.* at the Rate of 5 *s.* 4 *d. per oz.* I demand the Weight of it? *Answ.* 39 *oz.* 15 *dwts.*

36. A Man bought a Piece of Cloth for 16 *l.* 10 *s.* at 15 *s. per* Yard, how many Yards did it contain? *Answ.* 22 *Yds.*

37. If 1 *C.* Weight of Cheese cost 37 *s.* 4 *d.* what is that *per lb.*? *Answ.* 4 *d.*

38. Coals at 33 *s. per* Chaldron, how much *per* Bushel? *Answ.* 11 *d.*

39. What coſt 49392 Caſe Knives, at 4 *s.* 4 *d. per* Dozen?
Anſw. 891 *l.* 16 *s.*

40. If a Gentleman has an Eſtate of 245 *l.* 10 *s.* a Year, how much may he ſpend one Day with another, to lay up 60 Guineas at the Year's End? *Anſw.* 10 *s. per* Day.

41. If 17 *C.* 3 *qrs.* 14 *lb.* of Tobacco, coſt 133 *l.* 13 *s.* 4 *d.* what coſt 1 *oz?* *Anſw.* 1 *d.*

42. If 1 *C.* Weight of Lead coſt 15 *s.* 11 *d.* what coſt 5 Fother? *Anſw.* 77 *l.* 11 *s.* 10 *d.* $\frac{1}{2}$.

43. When the Tun of Wine coſt 42 *l.* what coſt 1 Quart? *Anſw.* 10 *d.*

44. At a Noble *per* Week, how many Months Board may I have for 50 *l.?* *Anſw.* 37 *Months,* 2 *Weeks.*

45. What coſt a Pack of Wool, weighing 2 *C.* 1 *qr.* 19 *lb.* at 8 *s.* 6 *d. per* Stone? *Anſw.* 8 *l.* 4 *s.* 6 *d.* 1 *qr.* $\frac{10}{14}$.

46. What is Cheeſe *per C.* Weight, at 3 *d.* $\frac{1}{2}$ *per lb.?* *Anſw.* 1 *l.* 12 *s.* 8 *d.*

47. If a Yard of Cambric coſt 12 *s.* what coſt 4 Pieces, each 20 Yards? *Anſw.* 48 *l.*

48. If a Yard of Broad Cloth coſt 18 *s.* what coſt 5 Pieces, each 20 Yards? *Anſw.* 90 *l.*

49. If Lead be ſold for 1 *d.* $\frac{1}{2}$ *per lb.* what is 3 *C.* Weight worth? *Anſw.* 2 *l.* 2 *s.*

50. If Coffee be ſold for 8 *d.* $\frac{1}{4}$ *per oz.* what is 6 *C.* Weight worth? *Anſw.* 369 *l.* 12 *s.*

2. *Of* INVERSE PROPORTION.

Q. *What is* Inverſe Proportion?

A. *Inverſe Proportion* is when *more* requires *leſs,* or *leſs* requires *more.*

Q. *What is meant by* more requires leſs?

A. *More requires leſs* is when the third Term is *greater* than the firſt, and requires the fourth Term to be *leſs* than the ſecond.

Q. *What is meant by* leſs requires more?

A. *Leſs requires more,* is when the third Term is *leſs* than the firſt, and requires the fourth Term to be *greater* than the ſecond.

Q. *How is the fourth Term in* Inverſe Proportion *found?*

A. By multiplying the firſt and ſecond Terms together, and dividing that Product by the *third Term.*

Q. *What* Proportion *does the* fourth Term *bear to any of the reſt?*

A. It bears ſuch Proportion to the *Second,* as the *Firſt* does to the *Third.*   EXAM-

EXAMPLES.

1. If 48 Men can build a Wall in 24 Days, how many Men can do the same in 192 Days? *Answ* 6 Men.

2. If I lent my Friend 100 *l.* for 6 Months (allowing the Month to be 30 Days) how long ought he to lend me 1000 *l.* to requite my Kindness? *Answ.* 18 Days.

3. If 100 *l.* in 12 Months gain 6 *l.* Interest, what Principal will gain the same in 8 Months? *Answ.* 150 *l.*

4. If a Footman performs a Journey in 3 Days, when the Days are 16 Hours long, how many Days will he require of 12 Hours long, to go the same Journey in? *Answ.* 4 Days.

5. How many Yards of Matting, that is half Yard wide, will cover a Room that is 18 Feet wide, and 30 Feet long? *Answ.* 120 *Yards.*

6. If 28 *s.* will pay for the Carriage of an *C.* Weight 150 Miles, How far may 6 *C.* Weight be carried for the same Mony? *Answ.* 25 *Miles*

7. How much in Length, that is 3 Inches broad, will make a Foot square? *Answ.* 48 *Inches.*

8. If 15 Shillings worth of Wine will serve 46 Men, when the Tun is worth 12 *l.* how many Men will the same 15 Shillings-worth suffice, when the Tun is worth but 8 *l.?* *Answ.* 69 *Men.*

9. If when the Price of a Bushel of Wheat is 6 *s.* 3 *d.* the Penny-loaf will weigh 9 *oz.* what must the Penny-loaf weigh, when Wheat is at 4 *s.* 6 *d.* the Bushel? *Answ.* 12 *oz.* 10 *dwts.*

10. Suppose 800 Soldiers were placed in a Garrison, and their Provisions were computed sufficient for 2 Months; how many Soldiers must depart, that the Provisions may serve them 5 Months? *Answ.* 480 *Men.*

11. There is a Cistern, having a Cock, which will empty it in 12 Hours; I demand how many Cocks, of the same Capacity, there must be to empty it in a Quarter of an Hour? *Answ.* 48 *Cocks.*

12. There was a certain Building raised in 8 Months by 120 Workmen, but the same being demolish'd, it is required to be rebuilt in 2 Months; I demand how many Men must be employed about it? *Answ.* 480 Men.

13. A Piece of Tapestry is 3 Ells Flemish wide, and 4 Ells Flemish long, and it is required to be lined with something that is but 3 quarters of a Yard wide; I demand how many Yards there must be to compleat the Lining? *Answ.* 9 *Yards.*

Of

Of PRACTICE.

Q. WHAT is Practice?

A. It is a short Way of finding the Value of any Quantity of Goods, by the given Price of one Integer.

Q. *How do you prove Questions in* Practice?

A. By the Single Rule of Three Direct: Or Practice may be proved by itself, by varying the Parts.

The TABLES.

s.	d.	l.	s.	d.	l.	s.	d.	Cwt.	lb.
$\frac{1}{2}$ is	6	$\frac{1}{2}$ is	10	0	$\frac{1}{15}$	1	4	$\frac{1}{2}$ is	56
$\frac{1}{3}$	4	$\frac{1}{3}$	6	8	$\frac{1}{18}$	1	3	$\frac{1}{4}$	28
$\frac{1}{4}$	3	$\frac{1}{4}$	5	0	$\frac{1}{20}$	1	0	$\frac{1}{7}$	16
$\frac{1}{6}$	2	$\frac{1}{5}$	4	0	$\frac{1}{30}$	0	8	$\frac{1}{8}$	14
$\frac{1}{8}$	1 $\frac{1}{2}$	$\frac{1}{6}$	3	4	$\frac{1}{40}$	0	6	$\frac{1}{14}$	8
$\frac{1}{12}$	1	$\frac{1}{8}$	2	6	$\frac{1}{60}$	0	4	$\frac{1}{16}$	7
		$\frac{1}{10}$	2	0	$\frac{1}{80}$	0	3		
		$\frac{1}{12}$	1	8	$\frac{1}{120}$	0	2		

CASE I.

Q. *What must be done with the Price of an* Integer, *when it is less than a Penny?*

A. Find the aliquot Parts of that Price contained in a *Penny,* which must be *Divisors* to the given Sum; that is, if the *Price* be a Farthing, say a Farthing is the Fourth of a Penny, and set it thus, $|\frac{1}{4}|\frac{1}{4}|$. If the Price be an Halfpenny, then say, a Halfpenny is the Half, thus, $|\frac{1}{2}|\frac{1}{2}|$. If it is three Farthings then say, a Halfpenny is the half of a Penny, and a Farthing is the Fourth of a Penny, thus, $\left|\begin{array}{c}\frac{1}{2}\\\frac{1}{4}\end{array}\right|\frac{1}{4}|$

Q. *What do you observe concerning these Columns.*

A. The first Column contains the *Mony*, and the other the *Parts.*

Note 1, *When there are more* aliquot Parts *than one, their* Quotients *must be added together, and the Sum, if the first* aliquot Part *be taken from a* Penny, *will be* Pence: *If it be taken from a* Shilling, *will be* Shillings; *or if it be taken from a* Pound *will be* Pounds.

2. *It is frequently better to take* Parts *of* Parts *than* Parts *of the whole Price; and then the* three Farthings *above-mentioned may as well be taken thus,* $\left|\begin{array}{c}\frac{1}{2}\\\frac{1}{4}\end{array}\right|\frac{1}{2}|$ *that is, a Halfpenny is the half of a Penny, and a Farthing is the half of a Halfpenny.*

D   EXAM-

EXAMPLES.

¼	¼	7 6 1 2 at ¼		1280 at ¼
	12	1 9 0 3		Facit 1l. 6s. 8d.
	2|0	1 5\8		
		7l. 18s. 7d.		
½	½	6 8 1 2 at ½		7672 at ½
	12	3 4 0 6		Facit 15l. 19s. 8d.
	2|0	2 8|3 10		
		14l. 3s. 10d.		
½	½	4 7 1 2 at ¾		9180 at ¾
¼	½	2 3 5 6		Facit 28l. 13s. 9d.
		1 1 7 8		
	12	3 5 3 4		
	2|0	2 9|4 6		
		14l. 14s. 6d.		

CASE 2.

Q. *What muſt be done with the Price of an* Integer, *when it is leſs than a* Shilling?

A. Find the aliquot Parts of that Price contain'd in a *Shilling*, which muſt be Diviſors to the given Sum. Or thus,

If the given *Price* be not the aliquot Part of a *Shilling*, then firſt take ſome Part of it that is an aliquot Part; and for the remaining Part of the *Price*, let it be taken out of the foregoing Part or Parts, and then add the Quotients together as before; the Total will be the Anſwer in *Shillings*.

EXAMPLES.

1	1/12	7 6 1 2 *at* 1 d.		6812 *at* 1 d.
	2|0	6 3|4		Facit 28l. 7s. 8d.
		3 1l. 14s. 4d.		
1	1/12	8 6 1 2 *at* 1 d. ¼.		1861 *at* 1 d. ¼
¼	¼	7 1 7 8		Facit 9l. 13s. 10d. ¼
		1 7 9 5		
	2|0	8 9|7 1		4121 *at* 1 d. ½.
		4 4l. 17s. 1d.		Facit 25l. 15s. 1d. ½

1861 *at* 1 *d.* $\frac{1}{2}$	6001 *at* 4 *d.* $\frac{1}{2}$
Facit 13 *l.* 11 *s.* 4 *d.* $\frac{3}{4}$	*Facit* 112 *l.* 10 *s.* 4 *d.* $\frac{1}{2}$
4761 *at* 2 *d.*	7121 *at* 4 *d.* $\frac{3}{4}$
Facit 39 *l.* 13 *s.* 6 *d.*	*Facit* 140 *l.* 13 *s.* 8 *d* $\frac{3}{4}$
6181 *at* 2 *d.* $\frac{1}{4}$	7181 *at* 5 *d.*
Facit 57 *l.* 18 *s.* 11 *d.* $\frac{1}{4}$	*Facit* 149 *l.* 12 *s.* 1 *d.*
1218 *at* 2 *d.* $\frac{1}{2}$	8121 *at* 5 *d.* $\frac{1}{4}$
Facit 12 *l.* 13 *s.* 9 *d.*	*Facit* 177 *l.* 12 *s.* 11 *d.* $\frac{1}{4}$
8012 *at* 2 *d.* $\frac{3}{4}$	6128 *at* 5 *d.* $\frac{1}{2}$
Facit 91 *l.* 16 *s.* 1 *d.*	*Facit* 140 *l.* 8 *s.* 8 *d.*
7612 *at* 3 *d.*	6100 *at* 5 *d.* $\frac{3}{4}$
Facit 95 *l.* 3 *s.*	*Facit* 146 *l.* 2 *s.* 11 *d.*
6128 *at* 3 *d.* $\frac{1}{4}$	1000 *at* 6 *d.*
Facit 82 *l.* 19 *s.* 8 *d.*	*Facit* 25 *l.*
6180 *at* 3 *d.* $\frac{1}{2}$	7610 *at* 6 *d.* $\frac{1}{4}$
Facit 90 *l.* 2 *s.* 6 *d.*	*Facit* 198 *l.* 3 *s.* 6 *d.* $\frac{1}{2}$
7812 *at* 3 *d.* $\frac{3}{4}$	1218 *at* 6 *d.* $\frac{1}{2}$
Facit 122 *l.* 1 *s.* 3 *d.*	*Facit* 32 *l.* 19 *s.* 9 *d.*
8120 *at* 4 *d.*	6000 *at* 6 *d.* $\frac{3}{4}$
Facit 135 *l.* 6 *s.* 8 *d.*	*Facit* 168 *l.* 15 *s.*
7000 *at* 4 *d.* $\frac{1}{4}$	7101 *at* 7 *d.*
Facit 123 *l.* 19 *s.* 2 *d.*	*Facit* 207 *l.* 2 *s.* 3 *d.*

1001 *at* 7 *d.* ¼	5918 *at* 9 *d.* ¾
Facit 30 *l.* 4 *s.* 9 *d.* ¼	*Facit* 240 *l.* 8 *s.* 4 *d.* ½
4100 *at* 7 *d.* ½	8121 *at* 10 *d.**
Facit 128 *l.* 2 *s.* 6 *d.*	*Facit* 338 *l.* 7 *s.* 6 *d.*
6120 *at* 7 *d.* ¾	6712 *at* 10 *d.* ¼
Facit 197 *l.* 12 *s.* 6 *d.*	*Facit* 286 *l.* 13 *s.* 2 *d.*
7100 *at* 8 *d.*	1002 *at* 10 *d.* ½
Facit 236 *l.* 13 *s.* 4 *d.*	*Facit* 43 *l.* 16 *s.* 9 *d.*
6100 *at* 8 *d.* ¼	4680 *at* 10 *d.* ¾
Facit 209 *l.* 13 *s.* 9 *d.*	*Facit* 209 *l.* 12 *s.* 6 *d.*
8000 *at* 8 *d.* ½	1260 *at* 11 *d.*
Facit 283 *l.* 6 *s.* 8 *d.*	*Facit* 57 *l.* 15 *s.*
6000 *at* 8 *d.* ¾	6121 *at* 11 *d.* ¼
Facit 218 *l.* 15 *s.*	*Facit* 286 *l.* 18 *s.* 5 *d* ¼
9000 *at* 9 *d.*	1234 *at* 11 *d.* ½
Facit 337 *l.* 10 *s.*	*Facit* 59 *l.* 2 *s.* 7 *d.*
4121 *at* 9 *d.* ¼	2345 *at* 11 *d.* ¾
Facit 158 *l.* 16 *s.* 7 *d* ¼	*Facit* 114 *l.* 16 *s.* 1 *d.* ¾
6100 *at* 9 *d* ½	100 *at* 11 *d.* ¾
Facit 241 *l.* 9 *s.* 2 *d.*	*Facit* 4 *l.* 17 *s.* 11 *d.*

* Note, *When the Price of an* Integer *is* 10 *d.* annex *a Cypher to the given* Number, *and divide by* 12 *and by* 20.

CASE

CASE 3.

Q. What must be done with the Price of an Integer, when it is greater than a Shilling, but less than two Shillings?

A. Let the *Part* or *Parts* be taken only with so much of the given *Price* as is more than one *Shilling*; that is, if the *Price* be 14*d* ½, take the Parts only with 2*d* ¼, and let the given Quantity stand for *Shillings*, which must be added with the rest; and the Total will be the Answer in *Shillings*.

EXAMPLES.

¼ ¼	486 at 12*d.* ¼	1281 at 13 *d.* ¼
12	121 ¼	*Facit* 70 *l.* 14 *s.* 5 *d.* ¼
	10 1 ¼	
2|0	496 1 ½	6100 at 13 *d.* ½
	24 *l.* 16 *s.* 1 *d* ½	*Facit* 343 *l.* 2 *s.* 6 *d.*
½ ½	486 at 12 *d.* ½	1210 at 13 *d.* ¾
12	243	*Faci.* 69 *l.* 6 *s.* 5 *d.* ½
	20 3	
2|0	50 6 3	1210 at 14 *d.*
	25 *l.* 6 *s.* 3 *d.*	*Facit* 70 *l.* 11 *s.* 8 *d.*
	76 2 at 12 *d.* ¼	1271 at 14 *d.* ¼
	Facit 388 *l.* 10 *s.* 7 *d.*	*Facit* 75 *l.* 9 *s.* 3 *d.* ¼
	1216 at 12 *d.* ½	6120 at 14 *d.* ½
	Facit 63 *l.* 6 *s.* 8 *d.*	*Facit* 369 *l.* 15 *s.*
	1216 at 12 *d.* ¾	1210 at 14 *d.* ¾
	Facit 64 *l.* 12 *s.*	*Facit* 74 *l.* 7 *s.* 3 *d.* ½
	6121 at 13 *d.*	1260 at 15 *d.*
	Facit 331 *l.* 11 *s.* 1 *d.*	*Facit* 78 *l.* 15 *s.*

1612 at 15 d. ¼	4560 at 18 d.
Facit 102 l. 8 s. 7 d.	Facit 342 l.
1210 at 15 d. ½	5670 at 18 d. ¼
Facit 78 l. 2 s. 11 d.	Facit 431 l. 3 s. 1 d. ½
7612 at 15 d. ¾	6789 at 18 d. ½
Facit 499 l. 10 s. 9 d.	Facit 523 l. 6 s. 4 d. ½
6100 at 16 l.	7890 at 18 d. ¾
Facit 406 l. 13 s. 4 d.	Facit 606 l. 8 s. 1 d. ½
7121 at 16 d ¼	8900 at 19 d.
Facit 482 l. 3 s. 0 d. ¼	Facit 704 l. 11 s. 8 d.
1218 at 16 l. ½	9000 at 19 d. ¼
Facit 83 l. 14 s. 9 d.	Facit 721 l. 17 s. 6 d.
8100 at 16 d ¾	9876 at 19 d. ½
Facit 565 l. 6 s. 3 d.	Facit 802 l. 8 s. 6 d.
4128 at 17 d.	8765 at 19 d. ¾
Facit 292 l. 8 s.	Facit 721 l. 5 s. 8 d. ¾
1230 at 17 d. ¼	7120 at 20 d. ¼
Facit 88 l. 8 s. 1 d. ½	Facit 600 l. 15 s.
2340 at 17 d ½	6543 at 20 d. ½
Facit 170 l. 12 s. 6 d.	Facit 558 l. 17 s. 7 ½
3450 at 17 d. ¾	5432 at 20 d. ¾
Facit 255 l. 3 s. 1 d. ½	Facit 469 l. 12 s. 10 d.

4321

4321 *at* 21 *d.*	6700 *at* 22 *d.* $\frac{1}{2}$
Facit 378 *l.* 1 *s.* 9 *d.*	*Facit* 628 *l.* 2 *s.* 6 *d.*
3210 *at* 21 *d.* $\frac{1}{4}$	6812 *at* 22 *d.* $\frac{3}{4}$
Facit 284 *l.* 4 *s.* 4 *d.* $\frac{1}{2}$	*Facit* 645 *l.* 14 *s.* 5 *d.*
2100 *at* 21 *d.* $\frac{1}{2}$	1210 *at* 23 *d.*
Facit 188 *l.* 2 *s.* 6 *d.*	*Facit* 115 *l.* 19 *s.* 2 *d.*
1000 *at* 21 *d.* $\frac{3}{4}$	1800 *at* 23 *d.* $\frac{1}{4}$
Facit 90 *l.* 12 *s.* 6 *d.*	*Facit* 173 *l.* 7 *s.* 6 *d.*
1030 *at* 22 *d.* *	6760 *at* 23 *d.* $\frac{1}{2}$
Facit 99 *l.* 18 *s.* 4 *d.*	*Facit* 661 *l.* 18 *s.* 4 *d.*
9010 *at* 22 *d.* $\frac{1}{4}$	9990 *at* 23 *d.* $\frac{3}{4}$
Facit 835 *l.* 6 *s.* 0 *d.* $\frac{1}{2}$	*Facit* 988 *l.* 11 *s.* 10 *d.* $\frac{1}{2}$

* Note, *When the Price of an* Integer *is* 22 *d. annex a* Cypher *to the given Number, and divide by* 12 (*as at* 10 *d.*) *then add both Lines together; the Sum will be the* Total *in* Shillings.

CASE 4.

Q. *What muft be done with the* Price *of an* Integer, *when it is any even Number of* Shillings *under* 20 *s. as* 6 *s.* 8 *s.* &c.

A. Multiply the given Quantity by half of the *Price*, and double the firft Figure of the Product for *Shillings*, and the reft of the *Product* will be *Pounds*.

Note, *This Rule is taken from an Operation in* Decimals.

EXAMPLES.

486 *at* 2 *s.* 1	7612 *at* 2 *s.*
48 *l.* 12 *s.*	*Facit* 761 *l.* 4 *s.*
769 *at* 4 *s.* 2	1286 *at* 4 *s.*
153 *l.* 16 *s.*	*Facit* 257 *l.* 4 *s.*

L 4

7618 at 6 *s.*	171 *at* 14 *s.*
Facit 2285 *l.* 8 *s.*	*Facit* 119 *l.* 14 *s.*
191 *at* 8 *s.*	171 *at* 16 *s.*
Facit 76 *l.* 8 *s.*	*Facit* 136 *l.* 16 *s.*
180 *at* 10 *s.**	712 *at* 18 *s.*
Facit 90 *l.*	*Facit* 640 *l.* 16 *s.*

* Note, *When the Price of an* Integer is 10 s. *you may take half of the given Integers, and it is done; and the Remainder (if there be any) will be* 10 s.

C A S E   5.

Q *What must be done with the Price of an* Integer, *when it is any odd Number of* Shillings *under* 20, *as* 3 s. 5 s. &c. ?

A. Multiply the given *Integers* by the *Price*, and that Product divide by 20, the Quotient will be the *Answer.*

E X A M P L E S.

121 *at* 1 *s.*	121 *at* 11 *s.*
Facit 6 *l.* 1 *s.*	*Facit* 66 *l.* 11 *s.*
121 *at* 3 *s.*	600 *at* 13 *s.*
Facit 18 *l.* 3 *s.*	*Facit* 390 *l.*
471 *at* 5 *s.**	190 *at* 15 *s.*
Facit 117 *l.* 15 *s.*	*Facit* 142 *l.* 10 *s.*
860 *at* 7 *s.*	121 *at* 17 *s.*
Facit 301 *l.*	*Facit* 102 *l.* 17 *s.*
612 *at* 9 *s.*	100 *at* 19 *s.*
Facit 275 *l.* 8 *s.*	*Facit* 95 *l.*

* Note, *When the Price of an* Integer is 5 s. *the Work may be done at once, because* 5 s. *is the fourth Part of a Pound.*

C A S E

CASE 6.

Q. *What must be done with the Price of an* Integer, *when it is* Shillings *and* Pence ?

A. 1. If the *Shillings* and *Pence* be the *aliquot* Part of a *Pound*, it may be done at once, as 6 *s.* 8 *d.* is the third of a *Pound.*

EXAMPLES

12 at 6 *s.* 8 *d.*	21 at 2 *s.* 6 *d.*
Facit 4 *l.*	Facit 2 *l.* 12 *s.* 6 *d.*
69 at 3 *s.* 4 *d.*	96 at 1 *s.* 8 *d.*
Facit 11 *l.* 10 *s.*	Facit 8 *l.*

2. If the *Shillings* and *Pence* be not the *aliquot* Part of a *Pound*, or if there be *Shillings*, *Pence*, and *Farthings*, multiply the given Quantity by the *Shillings*, and take Parts with the rest, and add them together; the Sum will be the Answer in *Shillings*.

EXAMPLES.

3 ¼	1 2 6 at 9 *s.* 3 *d.*	70 at 7 *s.* 4 *d.* ¾
	9	Facit 25 *l.* 17 *s.* 8 *d.* ½
	1 1 3 4	
	3 1 6	55 at 4 *s.* 8 *d.* ½
2|0 1 1 6|5 6		Facit 12 *l.* 18 *s.* 1 *d.* ½
	5 8 *l.* 5 *s.* 6 *d.*	
	86 at 6 *s.* 10 *s.*	77 at 10 *s.* 6 *d.* ¼
	Facit 29 *l.* 7 *s.* 8 *d.*	Facit 40 *l.* 10 *s.* 1 *s.* ¼
	10 at 12 *s.* 4 *d.*	12 at 13 *s.* 10 *d.* ½
	Facit 6 *l.* 3 *s.* 4 *d.*	Facit 8 *l.* 6 *s.* 6 *d.*
	30 at 4 *s.* 9 *d.*	17 at 17 *s.* 4 *d.* ¼
	Facit 7 *l.* 2 *s.* 6 *d.*	Facit 14 *l.* 15 *s.* 0 *d.* ¾
	73 at 7 *s.* 6 *d.*	46 at 7 *s.* 3 *d.* ¾
	Facit 27 *l.* 7 *s.* 6 *d.*	Facit 16 *l.* 16 *s.* 4 *d.* ½

CASE

C A S E 7.

Q. *What muft be done with the* Price *of an* Integer, *when it is* Pounds *only?*

A. Multiply the given *Integers* by the *Price*, the Product will be the *anfwer*.

E X A M P L E S.

72 at 5 *l.*	19 at 4 *l.*
Facit 360 *l.*	Facit 76 *l.*
64 at 3 *l.*	46 at 7 *l.*
Facit 192 *l.*	Facit 322 *l.*

C A S E 8.

Q. *What muft be done with the* Price *of an* Integer, *when it is* Pounds *and* Shillings?

A. Multiply the *Integers* given, by the *Pounds*; then proceed with the *Shillings*, if they are *even*, according to *Cafe* 4; but if they are *odd*, according to *Cafe* 5, and add them together; the Total will be the *Anfwer*.

E X A M P L E S.

26 at 4 *l.* 8 *s.*	48 at 7 *l.* 10 *s.*
4	
104	Facit 360 *l.*
10 8	
114 *l.* 8 *s.*	26 at 11 *l.* 1¼ *s.*
	Facit 304 *l.* 4 *s.*
4 9 at 3 *l.* 7 *s.*	15 at 4 *l.* 13 *s.*
7	
2'0 3 4|3	Facit 69 *l.* 15 *s.*
17 3	
1 4 7	.17 at 9 *l.* 15 *s.*
1 6 4 *l.* 3 *s.*	Facit 165 *l.* 15 *s.*
36 at 5 *l.* 13 *s.*	16 at 3 *l.* 6 *s.*
Facit 203 *l.* 8 *s.*	Facit 52 *l.* 16 *s.*

C A S E

C A S E 9.

Q. *What must be done with the* Price *of an* Integer, *when it is* Pounds, Shillings, *and* Pence?

A. 1. If the *Shillings* and *Pence* be the aliquot Part of a *Pound*, multiply the given *Integers* by the *Pounds*, and divide by the *aliquot Part:* Those Numbers so found out, being added together, will be the Sum required.

E X A M P L E S.

47 at 3 *l.* 3 *s.* 4 *d.*		17 at 2 *l.* 6 *s.* 8 *d.*
Facit 148 *l.* 16 *s.* 8 *d.*		*Facit* 39 *l.* 13 *s.* 4 *d.*
20 at 4 *l.* 13 *s.* 4 *d.*		30 at 1 *l.* 2 *s.* 6 *d.*
Facit 93 *l.* 6 *s.* 8 *d.*		*Facit* 33 *l.* 15 *s.*

2 If the *Shillings* and *Pence* be not the aliquot Part of a *Pound*, or if there be *Shillings*, *Pence* and *Farthings* given with the *Pounds*, then reduce the *Pounds* and *Shilings* into *Shillings*, and multiply the given *Integers* by the said *Shillings*; next take Parts with the rest of the *Price*, and add them together as before.

E X A M P L E S.

		1 2 0 at 4 *l.* 7 *s.* 3 *d.* $\frac{1}{2}$		21 at 5 *l.* 14 *s.* 7 *d.* $\frac{1}{2}$
		87 20		
		10 4 0 0 87		*Facit* 120 *l.* 6 *s.* 8 *d.* $\frac{1}{4}$
		3 0		
		5		70 at 1 *l.* 14 *s.* 7 *d.*
		10 4 7 5		*Facit* 121 *l.* 0 *s.* 10 *d.*
		5 2 3 *l.* 15 *s.*		
		14 at 2 *l.* 10 *s.* 6 *d.*		46 at 3 *l.* 19 *s.* 8 *d.* $\frac{1}{2}$
		Facit 35 *l.* 7 *s.*		*Facit* 183 *l.* 6 *s.* 7 *d.*

Q. *What other Ways have you of answering* Questions *in this Case?*

A. 1. When the Number of *Integers* does not exceed 12, multiply the *Price* by the *Integers*, as in *Compound Multiplication*, the *Product* will be the *Answer*.

2. When the Number of *Integers* does exceed 12, multiply the *Price* by the *Parts* instead of the *Whole*. Or,

3. You

3. You may multiply the *Price* by the whole Number of *Integers*. Thus,

53361 *Hhds. of Tobacco, at* 48 *l.* 12 *s.* 9 *d. per Hhd.*

```
    l.   s.  d.                        Memorandum.
    48  12   9                    1.  |  2   |  3.  |  4.
            58361                 s.  d. | s.  d. | s.  d. | s.  d.
    ─────────────────            16   6 |       |       |
    48  12   9                   18   3 |  2   6 |       |
  2918   5   0                    2   6 |       |       |
 14591   5   0                    3   9 | 17   6 | 15   0 | 10   0
389100   0   0
2431875  0   0
 ─────────────────
2838533  2   9
```

Q. *How is it wrought?*

A. Multiply by the feveral Figures in the *Multiplier,* as in *Compound Multiplication,* but with this Difference, that the *Products* of the *Shillings* and *Pence,* multiplied by the 6, 3, 8, and 5. muft be placed by themfelves in a *Memorandum,* and the *Products* of the *Pounds* by the fame Figures, placed as in *Simple Multiplication.* Thus,

```
              l.   s.   d.
              48.  12   9
                   58361
           ─────────────────        Memor.
 1 Product  ─  ─ 48  12   9         s.   d.
 2  ─  ─  ─  291                    16   6
 3  ─  ─  ─  145                    18   3
 4  ─  ─  389                        2   0
 5  ─  ─  234                        3   9
           ─────────────────
```

Then to fill up the *Blanks* in the *fecond Product,* take half of the 16 *s.* in the *Momorandum,* which is 8, and fet it in the *Units* Place of the *Pounds.* Annex a *Cypher* to the 6 *d.* which makes 60 *d.* or 5 *s.* place this under the *Shillings,* and the Line is done with, there being no Pence remaining.

For the *Blanks* in the *third Product,* take half of the 18 *s.* in the *Memorantum,* and put it in the *Tens* Place of the *Pounds.* Annex a *Cypher* to the 3 *d.* which makes 30 *d.* or 2 *s.* 6 *d.* this put in the *fecond Memorandum.* Then take half of the 2 *s.* in this new *Memorandum,* and put it in the *Units* Place of the *Pounds.* Annex a *Cypher* to the 6 *d.* in the new *Memorandum,* which makes 60 *d.* or 5 *s.* put this in the Place of *Shillings,* and this Line is finifhed, there being no *Pence* remaining.

For

For the *Blanks* in the *fourth Product*, take half of the 2 *s*. in the first *Memorandum*, and put it in the *Hundreds* Place of the *Pounds*; and becauſe there remains nothing, nor are there any *Pence* in the *Memorandum*, therefore fill up the other *Blanks* with *Cyphers*, and the Line is finiſhed.

For the *Blanks* in the *fifth Product*, take half of the 3 *s*. in the *firſt Memorandum*, and put it in the *Thouſands* Place of the *Pounds*; then, becauſe there is one remaining, put that in the *ſecond Memorandum*. Annex a *Cypher* to the 9 *d*. which makes 90 *d*. or 7 *s*. 6 *d*. put this to the former 1, and it makes 17 *s*. 6 *d* take half of the 17 *s*. and put it in the *Hundreds* Place of the *Pound*; then, becauſe there is 1 remaining, put that in the *third Memorandum*. Annex a *Cypher* to the 6 *d*. and it makes 60 *d*. or 5 *s*. put this to the 1 in the *third Memorandum*, and it makes 15 *s*. take half of the 15 *s*. and put it in the *Tens* Place of the *Pound*; then, becauſe there remains 1, put it in the *fourth Memorandum*, and ſince there are no *Pence* in the *third Memorandum* to put a *Cypher* to, let a *Cypher* be annexed to the 1 in the *laſt Memorandum*, which makes 10 *s*. take half of this 10 *s*. and put it in the *Units* Place of the *Pounds*; then becauſe there are no *Pence* in the *Memorandum*, neither is there any thing remaining of the 10, therefore fill up the other *Blanks* with *Cyphers*, and the Line is compleated: Add all together, and their *Sum* is the Total *Product* of the Whole.

	l.	*s.*	*d.*		*Memorandum.*	
				1.	2.	3.
7000 *Hhds. of Wine, at*	17	14	8 *per Hhd.*	*s. d.*	*s. d.*	*s. d.*
		7000		2 8	6 8	6 8
124133		6	8			

Note 1. *To fill up the* Blanks *in the* Pounds *of the* Second, Third, *&c.* Products, *always take half of the* Shillings *in the* Memorandum; *and if* 1 *remains make a* new Memorandum *of it*.

2. *Always annex a* Cypher *to the* Pence, *and whatever Number of* Shillings *they make, put them to the* 1 *in the* new Memorandum; *and ſo on till all the* Blanks *in the* Pounds *are filled up: If there be any* Pence *yet remaining in the* Memorandum, *put a* Cypher *to them, and what* Shillings *and* Pence *they make, let them be put in the* Shillings *and* Pence *Place in the* Product.

3. *All the* Examples *in this* Caſe, *and* Caſe 8, *may ſerve here, inſtead of others.*

C A S E 10.

Q. *What muſt be done with the* Price *of an* Integer, *when both that and the* Quantity *given are of ſeveral Denominations?*

A. Multiply the *Price* by the *Integers*, and take Parts with the Parts of the *Integer*.

E X A M-

EXAMPLES.

C.	qrs.	lb.			l.	s.		l.	s.	d.
12	3	16	of Tobacco, at	4	12	per C. wt.	Facit	59	6	1½ +

$$\begin{array}{c|c|cc}
& & & 12 \\
\frac{1}{2} & \frac{1}{2} & & \\
& & 55 & 4 \\
\frac{1}{4} & \frac{1}{2} & 2 & 6 \\
16 & \frac{1}{7} & 1 & 3 \\
& & 0 & 13 & 1\frac{1}{2}+ \\
\hline
& & 59 & 6 & 1\frac{1}{2}+
\end{array}$$

C.	qrs.	lb.		l.	s.	d.		l.	s.	d.
12	2	14	of Tobacco, at	3	14	0	per C. Facit	46	14	3
17	3	19	of Sugar, at	2	2	6	per C. Facit	38	1	6¾
4	1	16	of Soap, at	3	12	0	per C. Facit	15	16	3½
10	0	12	of Tallow, at	1	19	6	per C. Facit	19	19	2½
5	1	0	of Tobacco, at	2	17	0	per C. Facit	14	19	3
4	3	0	of Sugar, at	2	18	6	per C. Facit	13	17	10½
7	0	19	of Sugar, at	3	16	0	per C. Facit	27	4	10½
5	2	10	of Tobacco, at	2	18	6½	per C. Facit	16	7	2½+
7	1	14	of Tobacco, at	3	15	9¼	per C. Facit	27	18	9½
9	2	26	of Tallow, at	4	10	4½	per C. Facit	43	19	6

Of INTEREST.

Q. HOW many kinds of Interest are there?
A. Two: *Simple* and *Compound.*

Of Simple INTEREST.

Q. *What is* Simple Interest?
A. *Simple Interest* is the *Profit* allowed in the lending or forbearance of any Sum of Mony, for some determined Space of Time.

Q. *What is the* Principal?
A. The *Principal* is any Sum of Mony lent, for which *Interest* is to be received.

Q. *What is the* Rate per Cent.?
A. It is a certain *Sum* agreed on between the *Lender* and the *Borrower*, to be paid for every 100 *Pounds*, for the Use of the *Principal*, which, according to the Laws of *England*, ought not to be above 5 l. for the Use of 100 l. for 1 Year, and 10 l. for the Use of 100 l. for two Years; and so on for any Sum of *Mony*, in Proportion to the *Time* proposed.

Q. *What*

Q. *What is the* Amount?

A. It is the *Principal* and *Intereft* added together.

Q. *What other Things is* Intereft *applicable to?*

A. It is applied to *Commiffion* or *Provifion, Brokage, Storage,* and *Infurance,* which have no refpect to *Time.*

CASE I.

Q. *How do you find the* Intereft *of any given Sum for a* Year?

A. Multiply the *Principal* by the *Rate per Cent.* and divide that Product by 100, the Quotient is the *Intereft* required.

Q. *How do you find the* Intereft *of any given* Sum *for feveral* Years?

A. Multiply the *Intereft* for one *Year* by the Number of *Years* given in the Queftion; the Product will be the *Anfwer.*

EXAMPLES.

1. If 100 *l.* in one Year's Time yield 5 *l.* Intereft, what will 486 *l.* yield in the fame Time? *Anfw.* 24 *l.* 6 *s.*

$$l.$$
$$486$$
$$5$$
$$24|30$$
$$|20$$
$$6\ 00$$

2. What is the Intereft of 220 *l.* for a Year, at 4 per Cent. per Ann? *Anfw.* 8 *l.* 16 *s.*

3. What is the Intereft of 76 *l.* for two Years, at 5 per Cent. per Ann.? *Anfw.* 7 *l.* 12 *s.*

4. What is the Amount of 400 *l.* for 12 Years, at 6 per Cent. per Ann.? *Anfw.* 688 *l.*

Of Factors *Allowances, commonly called* Commiffion *or* Provifion.

Q. *What is* Commiffion or Provifion?

A. It is an Allowance from *Merchants* to their *Factors* or *Agents* beyond the Sea, in the buying or felling of any fort of Goods; and is a certain *Rate per Cent.* according to the Cuftom of the Country where the *Factor* refides.

EXAMPLES.

5. My Factor fends me Word, that he has bought Goods to the Value of 500 *l.* 13 *s.* 6 *d.* upon my Account; I demand what his Commiffion comes to, at 3½ per Cent.? *Anfw.* 17 *l.* 10 *s.* 5 *d.* 2 *qrs.* $\frac{68}{100}$.

6. My

6. My Correfpondent has difburfed upon my Account, the Sum of 1009 *l.* 18 *s.* what muft he demand for his Commiffion, when I allow him 2¼ *per Cent.? Anfw.* 22 *l.* 14 *s.* 5 *d.* 1 *qr* $\frac{84}{100}$.

7. Suppofe I allow my Correfpondent 1¾ *per Cent.* for Provifion; what may he demand on the Difburfement of 704 *l.* 15 *s.* 4 *d.? Anfw,* 12 *l.* 6 *s.* 8 *d.* $\frac{2}{100}$.

C A S E 2.

Q. How do you find the Intereft *of any* Sum *for* ¼, ½, *or* ¾ *of a* Year, *befides the* Number *of* Years *given in the* Queftion?

A. For ¼ of a Year, take a *fourth* Part of the *Intereft* for one Year; for ½ a Year, take *half* of the *Intereft* for one Year; for ¾ of a Year, take the Parts compounded of ¼ and add them to the *Intereft* for the reft of the Time; the *Sum* will be the *Intereft* required.

E x a m p l e s.

1. What is the Intereft of 200 *l.* for 3 Years and ¾, at 5 *per Cent. per Annum? Anfw.* 37 *l.* 10 *s.*

2 0 0	½	½	10
5			3
1 0|0 0			30
	¼	½	5
			2 10

37 10

2. What is the Intereft of 468 *l.* 12 *s.* 4 *d.* for 1 Year and ¾, at 6 *per Cent. per Annum? Anfw.* 49 *l.* 4 *s.* 1 *d.*

3. What is the Intereft of 112 *l.* 10 *s.* 4 *d.* for 5 Years and ½, at 6 *per Cent. per Annum? Anfw* 37 *l.* 2 *s.* 6 *d.*+

4. What is the Intereft of 468 *l.* for 4 Years and ¼, at 6 *per Cent. per Annum? Anfw.* 119 *l.* 6 *s.* 8 *d* ¾.

5. What is the Intereft of 1000 *l.* for 2 Years ¾, at 4 *per Cent. per Annum? Anfw.* 110 *l.*

Of B r o k a g e.

Q. What is Brokage?

A. It is an Allowance made to Perfons called *Brokers,* at a certain *Rate per Cent.* for finding Cuftomers, and felling to them the Goods of other Men, whether Strangers or Natives.

Q. How do you find the Brokage *of any* Sum?

A. Divide the given Sum by 100, and take Parts from the Quotient with the *Rate per Cent.*

E x a m-

E X A M P L E S.

6. What is the Brokage of 700 *l.* 14 *s.* 6 *d.* at 4 *s.* per Cent. ?
Anfw. 1 *l.* 8 *s.* 0 *d.* $\frac{1}{4}$.

```
    l.   s.   d.              l.   s.   d.
  7 00  14   6      | 4 | 1/5 | 7   0   1 1/2
    20                      |
    --                       | 1   8   0 1/4 +
  0 14
   12
    --
  1 74
    4
    --
  2 96
```

7. What may a Broker demand for Brokage, when he fells Goods to the Value of 500 *l.* 10 *s.* 7 *d.* and I allow him 7 *s.* per Cent. ? *Anfw.* 1 *l.* 15 *s.* 0 *d.* $\frac{1}{4}$.

8. Suppofe I employ a Broker, who fells Goods to the Value of 909 *l.* 14 *s.* 10 *d.* what is the Brokage at 6 *s.* 6 *d* per Cent. ? *Anfw.* 2 *l.* 19 *s.* 1 *d.* $\frac{1}{4}$.

Note, *If the* Brokage *fhould be* 1 *l.* or more per Cent. *the Operation will be the fame with that in* Factors Allowances.

C A S E 3.

Q. *How is the* Intereft *of any* Sum *found,* when the *Rate per* Cent. is $\frac{1}{4}$, $\frac{1}{2}$, *or* $\frac{3}{4}$ more than the *Pounds* given in the faid *Rate* ?

A. Multiply the *Principal* by the *Pounds,* in the *Rate per Cent.* as before ; and let the *Parts* for $\frac{1}{4}$, $\frac{1}{2}$, or $\frac{3}{4}$, be taken from the *Principal,* and added to that *Product* ; then proceed according to *Cafe* 1 or 2.

E X A M P L E S.

1. What is the Intereft of 400 *l.* for 2 Years, at 5$\frac{1}{2}$ per Cent. per Annum. ? *Anfw.* 44 *l.*

2. What is the Intereft of 120 *l.* for a Year, at 4$\frac{1}{2}$ per Cent. per Annum ? *Anfw.* 5 *l.* 8 *s.*

3. What is the Amount of 690 *l.* for 3 Years, at 4$\frac{1}{4}$ per Cent. per Annum ? *Anfw.* 777 *l.* 19 *s.* 6 *d.*

4. What is the Amount of 120 *l.* 10 *s.* for 2 Years and an Half, at 4$\frac{3}{4}$ per Cent. per Annum ? *Anfw.* 134 *l.* 16 *s.* 1 *d.* $\frac{1}{4}$.

5. What is the Intereft of 300 *l.* for 5 Years and 3 Quarters, at 3$\frac{3}{4}$ per Cent. per Annum ? *Anfw.* 64 *l.* 13 *s.* 9 *d.*

C A S E

CASE 4.

Q. *How do you find the* Interest *of any* Sum, *for a certain Number of* Weeks?

A.   As 52 Weeks
         Are to the Interest of the given Sum for a Year:
         So are the Weeks given,
         To the Interest required.

EXAMPLES.

1 What is the Interest of 400 *l.* for a Week, at 5 *per Cent. per Annum? Anfw.* 7 *s.* 8 *d.* 1 *qr.* $\frac{12}{52}$.

2. What is the Interest of 126 *l.* 12 *s.* for 16 Weeks, at 4$\frac{1}{2}$ *per Cent. per Annum? Anfw.* 1 *l.* 15 *s.* 0 *d.* 2 *qrs.* $\frac{48}{52}$.

3. What is the Amount of 500 *l.* for 20 Weeks, at 3$\frac{1}{2}$ *per Cent. per Annum? Anfw.* 506 *l.* 14 *s.* 7 *d.* 1 *qr.* $\frac{28}{52}$.

CASE 5.

Q. *How is the* Principal *found, when the* Amount, Time, *and* Rate per Cent. *are given?*

A.   As the Amount of 100 *l.* at the *Rate* and *Time* given
         Is to 100 *l* :
         So is the *Amount* given,
         To the *Principal* required.

EXAMPLES.

1. What Principal being put to Interest for 9 Years, at 5 *per Cent. per Annum*, will amount to 725 *l.? Anfw.* 500 *l.*

2. What Principal being put to Interest for 7 Years, will amount to 793 *l.* 12 *s.* at 4 *per Cent. per Annum? Anfw.* 620 *l.*

3. What Sum being put to Interest, will amount to 520 *l.* 16 *s.* in 8 Years, at 3 *per Cent. per Annum? Anfw.* 420 *l.*

CASE 6.

Q. *How is the* Rate per Cent. *found, when the* Amount, Time *and* Principal *are given?*

A.   1. As the *Principal*
         Is to the *Interest* for the whole *Time:*
         So is 100 *l.*
         To its *Interest* for the same *Time.*

2. Divide the *Interest* last found, by the *Time*, and the Quotient will be the *Rate per Cent.*

EXAMPLES.

1. At what Rate of Interest *per Cent.* will 500 *l.* amount to 725 *l.* in 9 Years Time? *Anfw.* 5 *per Cent.*

2. At what Rate of Interest *per Cent.* will 620 *l.* amount to 793 *l.* 12 *s.* in 7 Years? *Anfw.* 4 *per Cent.*

3. At

3. At what Rate of Intereft *per Cent.* will 420 *l.* amount to 520 *l.* 16 *s.* in 8 Years? *Anfw.* 3 *per Cent.*

C A S E   7.

Q. *How is the* Time *found, when the* Principal, Amount, *and* Rate *per* Cent. *are given?*

A. As the Intereft of the Principal for 1 Year at the given Rate
  Is to one Year :
  So is the whole Intereft,
  To the Time required.

E X A M P L E S.

1. n what Time will 500 *l.* amount to 725 *l.* at 5 *per Cent. per Annum? Anfw.* 9 *Years.*

2. In what Time will 620 *l.* amount to 793 *l.* 12 *s.* at 4 *per Cent. per Annum? Anfw.* 7 *Years.*

3. In what Time will 420 *l.* amount to 520 *l.* 16 *s.* at 3 *per Cent. per Annum? Anfw.* 8 *Years.*

Q. *How are the* Queftions *in the foregoing* Cafes *proved?*

A. Cafes 1, 5, 6 and 7 do exactly prove each other, by varying the *Queftion :* yet all of them except *Cafe* 5 ; and the 1ft, 2d, 5th, 6th, and 7th *Queftions* in *Cafe* 1 ; and the 6th, 7th, and 8th, in *Cafe* 2, may as truly be anfwered by the *Double Rule of Three,* of which more hereafter.

Note 1. *The 1ft, 2d, 5th, 6th, and 7th* Queftions, *in* Cafe *1 ; and the 6th, 7th, and 8th, in* Cafe *2, are to be proved by the* Single Rule of Three.

2. *Cafe 5th, cannot be anfwered by the* Double Rule of Three, *becaufe the* Principal *is not known in the* Queftion, *and therefore there can be no Deduction of it from the* Amount, *to know the* Intereft, *which muft firft be done.*

Of Simple Intereft *for* Days.

Q. *How do you find the* Intereft *for any Number of* Days ?

A. Multiply the *Pence* of the *Principal* by the *Days,* and by the *Rate* of *Intereft* for a *Dividend,* and 365 by 100 for a *Divifor,* the *Quotient* will be the *Anfwer* in *Pence.*

Q. *How are the following* Queftions *proved?*

A. As 365 Days
  Are to the Intereft of the given Sum for a Year :
  So is the Time propofed,
  To the Intereft required.

E X A M P L E S.

1. What is the Intereft of 120 *l.* for 126 Days, at 4 *per Cent. per Annum? Anfw.* 1 *l.* 13 *s.* 1 *d.* 2 *qrs.* $\frac{258}{365}$.

2. What is the Intereft of 126 *l.* for 145 Days, at 6 *per Cent. per Annum? Anfw.* 3 *l.* 0 *s.* 0 *d.* 3 *qrs.* $\frac{57}{365}$.

3. What

3. What is the Intereft of 100 *l.* from *June* 1, 1767, to *March* 9, 1768, which is Leap Year, at 5 *per Cent. per Annum? Anfw.* 3 *l.* 17 *s.* 6 *d.* 1 *qr.* $\frac{235}{365}$.

4. What is the Intereft of 200 *l.* from *Auguft* 14, to *December* 19 following, at 6 *per Cent. per Annum? Anfw.* 4 *l.* 4 *s.* 1 *d* 3 *qrs.* $\frac{225}{365}$.

5. What is the Intereft of 10 *l.* for 25 Days, at 5 *per Cent. per Annum? Anfw.* 8 *d.* $\frac{80}{365}$.

6. What is the Intereft of 40 *l.* for 40 Days, at 4 *per Cent. per Annum? Anfw.* 3 *s.* 6 *d.* $\frac{30}{365}$.

See more of Simple Intereft *in* Decimals.

Of Compound INTEREST.

Q. What is Compound Intereft?

A. Compound Intereft is that which arifes from any *Principal* and its *Intereft* put together, as the Intereft ftill becomes due; and for that Reafon it is called *Intereft* upon *Intereft*, or *Compound Intereft*.

Q. Is it lawful to let out Mony *at* Compound Intereft?

A. No: Yet in purchafing of *Annuities* or *Penfions*, and *Leafes* in *Reverfion*, it is very ufual to allow *Compound Intereft* to the Purchafer for his *ready Mony*; and therefore it is very neceffary to underftand it.

Q. How do you find the Compound Intereft *of any given* Sum for any Number of Years?

A. 1. Find the *Amount* of the given Sum by *Simple Intereft* for the firft Year, which is the *Principal* for the fecond Year, then find the *Amount* of that *Principal* for the fecond Year, and that is the *Principal* for the third Year; and fo on for any Number of Years given.

2. Subtract the given Sum from the laft *Amount*, and the Remainder is the *Compound Intereft* required.

EXAMPLES.

1. What Sum will 450 *l.* amount to in 3 Years, at 5 *per Cent. per Annum,* Compound Intereft? *Anfw* 520 *l.* 18 *s.* 7 *d.* $\frac{1}{2}$.

2. What will 400 *l.* amount to in 4 Years, at 6 *per Cent. per Annum,* Compound Intereft? *Anfw.* 504 *l.* 19 *s.* 9 *d.* $\frac{1}{4}$.

3. What will 480 *l.* amount to in 6 Years, at 5 *per Cent. per Annum,* Compound Intereft? *Anfw.* 643 *l.* 4 *s.* 10 *d.* $\frac{1}{2}$.

4. What will 500 *l.* amount to in 4 Years, at 4$\frac{1}{4}$ *per Cent. per Annum,* Compound Intereft? *Anfw.* 590 *l.* 11 *s.* 5 *d.* $\frac{1}{2}$.

5. What is the Compound Intereft of 400 *l.* 10 *s.* at 3$\frac{1}{2}$ *per Cent. per Annum* for 3 Years? *Anfw.* 43 *l.* 10 *s.* 9 *d.* $\frac{1}{2}$.

Note, *See more of* Compound Intereft *in* Decimals.

Of

Of REBATE or DISCOUNT.

Q. WHAT is Rebate *or* Difcount?

A. *Rebate* or *Difcount* is when a *Sum* of Mony due at any Time to come, is fatisfied by paying fo much prefent Mony, as being put out to *Intereft*, would amount to the given *Sum* in the fame Space of *Time*.

Q. *How is the Operation perform'd?*

A.   1.   As 12 Months

Are to the *Rate per Cent.*:

So is the *Time* propofed

To a *fourth Number.*

2.   Add that *fourth Number* to 100 *l.*

3.   As that *Sum*

Is to the *fourth Number*:

So is the given *Sum*

To the *Rebate.*

4.   Subtract the *Rebate* from the given *Sum*, and the *Remainder* is the *prefent Worth*. Or thus,

3.   As that *Sum*

Is to 100 *l.*:

So is the given *Sum*

To the *prefent Payment.*

4.   Subtract the *prefent Payment* from the given *Sum*, and the *Remainder* is the *Rebate.*

Q. *How do you prove* Queftions *in* Rebate?

A. Find the *Amount* of the *prefent Payment* at the *Time* and *Rate per Cent.* given, and that will be equal to the given *Sum*.

EXAMPLES.

1. What is the Rebate of 795 *l.* 11 *s.* 2 *d.* for 11 Months, at 6 *per Cent.?* *Anfw.* 41 *l.* 9 *s.* 5 *d.* 3 *qrs.* $\frac{1572}{2332}$.

2. What is the prefent Worth of 161 *l.* 10 *s.* for 19 Months, at 5 *per Cent.?* *Anfw.* 149 *l.* 13 *s.* 0 *d.* $\frac{3}{4}$.

3. Sold Goods for 795 *l.* 11 *s.* 2 *d.* to be paid 4 Months hence, what is the prefent Worth, at 3½ *per Cent.?* *Anfw.* 786 *l.* 7 *s.* 8 *d.* $\frac{1}{4}$.

4. What is the prefent Worth of 4000 *l.* payable in 9 Months, at 4¾ *per Cent.?* *Anfw.* 3862 *l.* 8 *s.* 0 *d.* $\frac{1}{2}$.

5. How much ready Mony for a Note of 18 *l.* due 15 Months hence, at 5 *per Cent.?* *Anfw.* 16 *l.* 18 *s.* 10 *d.*

6. Suppofe 810 *l.* were to be paid 3 Months hence, allowing 5 *per Cent.* Difcount, what muft be paid in hand? *Anfw.* 800 *l.*

7. H

7. If a Legacy of 1000 *l.* is left me *July* 24, 1769, to be paid on the *Christmas-Day* following; what muſt I receive, when I allow 6 *per Cent.* for preſent Payment? *Anſw.* 975 *l.* 3 *s.* 1 *d.*

8. Being obliged by a Bond bearing date *Auguſt* 29, 1767, to pay next *Midſummer* which is Leap Year) 326 *l.* what muſt I pay down, if they allow Diſcount after the Rate of 8 *per Cent.?* *Anſw.* 305 *l.* 16 *s.* 6 *d.* $\frac{1}{4}$.

9. Sold Goods for 312 *l.* to be paid at two three Months, (that is, half at 3 Months, and the other half at 3 Months after that) what muſt be diſcounted for the preſent Payment, at 5 *per Cent.?* *Anſw.* 5 *l.* 14 *s.* 7 *d.*

10. Sold Goods for 300 *l.* to be paid at two three Months, (that is, one third at 2 Months, one third at 4 Months, and one third at 6 Months) what muſt be diſcounted for preſent Payment at 4 *per Cent.?* *Anſw.* 3 *l.* 18 *s.* 9 *d.*

11. What is the preſent Worth of 100 *l.* at 5 *per Cent.* payable at two four Months? *Anſw* 97 *l.* 11 *s.* 4 *d.* $\frac{1}{2}$.

12. I would know the preſent Worth of 150 *l.* payable at three four Months, at 5 *per Cent.* Diſcount? *Anſw.* 145 *l.* 3 *s.* 9 *d.* $\frac{1}{4}$.

13. What is the preſent Worth of 200 *l.* at 4 *per Cent.* payable as follows, *viz.* 100 *l.* at 2 Months; 50 *l.* at 3 Months; and 50 *l.* at 5 Months? *Anſw.* 198 *l.* 0 *s.* 6 *d.*

Of EQUATION *of* PAYMENTS;

The common Way.

Q. WHAT is Equation *of* Payments? A. When ſeveral Sums of Mony, to be paid at different Times, are reduced to one mean Time for the Payment of the Whole, without Loſs to *Debtor* or *Creditor*, this is called *Equation* of *Payments.*

Q. *Wherein may the* Debtor *or* Creditor *be ſaid to ſuffer Loſs, when the Debt is paid?*

A. 1. When one *mean Time* is aſſigned for the Payment of the whole Debt, and the Mony is not paid till ſome Time afterwards; then the *Debtor* ſuffers *Loſs* by paying not only the *Principal*, or Sum due, but alſo the *Intereſt* of that Sum for the Time of Forbearance, at 3, 4, or more *per Cent.* as they ſhall agree. Likewiſe, if the Mony be paid before it is due, then the *Creditor* ſuffers *Loſs* by allowing ſo much *per Cent.* by Agreement, for the Time of *prompt Payment.*

2. The

2. The *Loſs* to either Party, may be in reducing the ſeveral Times of Payment to one, which is not the true equated *Time* ; and then if the Payment be made after the true Time, the *Creditor* ſuffers *Loſs,* becauſe he receives no *Intereſt* for it : If the Time agreed on be before the true Time, then the *Debtor* ſuffers *Loſs,* becauſe he receives no *Intereſt* for his early Payment.

Q. *How is the Operation wrought ?*

A. Multiply each Payment by its Time, and divide the Sum of all the Products by the whole Debt, the Quotient is the *equated Time.*

Examples.

1. *A* owes *B* 100 *l.* whereof 50 *l.* is to be paid at 2 Months, and 50 *l.* at 4 Months ; but they agree to reduce them to one Payment ; when muſt the whole be paid ? *Anſw.* 3 *Months.*

2. A Merchant hath owing him 300 *l.* to be paid as follows : 50 *l.* at 2 Months, 100 *l.* at 5 Months, and the reſt at 8 Months ; and it is agreed to make one Payment of the Whole ; I demand when that Time muſt be ? *Anſw.* 6 *Months.*

3. *F* owes to *H* 1000 *l.* whereof 200 *l.* is to be paid preſent, 400 *l.* at 5 Months, and the reſt at 10 Months, but they agree to make one Payment of the Whole ; I demand the equated Time ? *Anſw.* 6 *Months.*

4. *K* is indebted to *L* a certain Sum, which is to be diſcharged at 4 ſeveral Payments, that is $\frac{1}{4}$ at 2 Months, $\frac{1}{4}$ at 4 Months, $\frac{1}{4}$ at 6 Months, and $\frac{1}{4}$ at 8 Months ; but they agreeing to make but one Payment of the Whole, the equated Time is therefore demanded ? *Anſw.* 5 *Month.*

5. *H* bought of *X* a Quantity of Goods upon Truſt, for which *H* was to pay $\frac{1}{3}$ of the Debt every 3 Months, till the Whole ſhould be diſcharged ; but they afterwards agreed to pay the Whole at one equated Time ; the Time is demanded ? *Anſw.* 6 *Months.*

6. *W* owes *Z* a Sum of Mony, which is to be paid, $\frac{1}{4}$ preſent, $\frac{1}{4}$ at 4 Months, and the reſt at 8 Months, what is the equated Time for the Whole ? *Anſw.* 3 *Months.*

7. *P* owes *Q* 420 *l.* which will be due 6 Months hence ; but *P* is willing to pay him 60 *l.* now, provided he can have the reſt forborn a longer Time : It is agreed on ; the Time of Forbearance therefore is required ? *Anſw.* 7 *Months.*

Note, *This* Queſtion *is in* Reverſe Proportion. *See more of this* Rule *in* Decimals.

Of BARTER.

Q. WHAT is Barter?

A. *Barter* is the Exchanging of one *Commodity* for another, and informs Merchants so to proportion their *Quantities*, as that neither may sustain *Loss.*

Q. *How do you prove Questions in* Barter?

A. By changing the Order of them.

EXAMPLES.

1. How much Sugar, at 9 *d. per lb.* must be given in Barter for 6 C. ½ of Tobacco, at 14 *d. per lb.? Answ.* 10 C. 0 qr. 12 *lb.* ⁴⁄₉.

2. What Quantity of Tea, at 10 *s. per lb.* must be given in Barter for 1 C. of Chocolate, at 4 *s. per lb.? Answ.* 44 *lb.* 12 oz. ²⁄₁₀.

3. How much Rice at 28 s. *per C. wt.* must be bartered for 3 C. ½ of Raisins, at 5 *d. per lb.? Answ.* 5 C. 3 qrs. 9 *lb.* ¹¹²⁄₃₃₆.

4. *A* and *B* bartered : *A* had 5 C. of Sugar, at 6 *d. per lb.* which he gave to *B* for a Quantity of Cinnamon, at 10 s. 8 *d. per lb.* I demand how much Cinnamon *B* gave *A? Answ.* 26 *lb.* 4 oz.

5. *B* delivered 3 *Hhds.* of Brandy, at 6 s. 8 *d. per* Gallon, to *C* for 126 Yards of Cloth : what was the Cloth *per* Yard ? *Answ.* 10 s.

6. *A* and *B* bartered : *A* had 12 C. of Sugar, worth 4 *d. per lb.* for which *B* gave him 1 C. ¾ of Cinnamon ; I demand how *B* rated his Cinnamon *per lb.? Answ.* 27 *d.* ⁸⁴⁄₁₂₆.

7. *A* hath Linen Cloth worth 20 *d.* an Ell ready Mony ; but in Barter he will have 2 s. *B* hath Broad Cloth worth 14 s. 6 *d. per* Yard ready Mony ; at what Price ought the Broad Cloth to be rated in Barter ? *Answ.* 17 s. 4 *d.* 3 qrs. ²⁄₁₀ *per Yard.*

8. *A* and *B* bartered : *A* had 41 *C. wt.* of Hops, at 30 s. *per* C. for which *B* gave him 20 *l.* in Mony, and the rest in Prunes, at 5 *d. per lb.* I demand how many Prunes *B* gave *A,* besides the 20 *l.? Answ.* 17 C. 3 qrs. 4 *lb.*

9. *C* hath Candles, at 6 s. *per* Dozen ready Mony ; but in Barter he will have 6 s. 6 *d. per* Dozen ; *D* hath Cotton at 9 *d. per lb.* ready Mony ; I demand what Price the Cotton must be at in Barter ; also how much Cotton must be bartered for 100 Dozen of Candles ? *Answ. The Cotton is* 9 *d.* 3 qrs. *per lb in Barter ; and* 7 C. 0 qr. 16 *lb. of Cotton must be given for* 100 *Dozen of Candles.*

Of LOSS *and* GAIN.

Q. WHAT *is* Lofs *and* Gain ?
     A. *Lofs* and *Gain* is a Rule which teacheth *Mer-chants* what they fhall *gain* or *lofe* in the Sale of their Goods, having the *Price* that they bought them for, and the *Price* for which they are to be fold, both known.

Q. *How are the following* Queftions *proved?*
     A. Let them be varied.

EXAMPLES.

1. Bought 18 C. of Cheefe, at 28 s. per C. which I fell out again at 3 d. $\frac{1}{2}$ per lb. what is the Profit in the Whole ? *Anfw.* 4 l. 4 s.

2. If I buy Deals in, at 20 d a-piece, and fell them again at 17 d. what fhall I lofe by 120 Dozen ? *Anfw* 18 l.

3. Hats bought at 4 s. a-piece, and fold again at 4 s. 9 d. what is the Profit in laying out 100 l. ? *Anfw.* 18 l. 15 s.

4. Bought 19 Fother of Lead, at 14 s. per C. what is gained by the whole, fold out at 4 d. per lb. ? *Anfw* 432 l. 5 s.

5. Bought 60 Reams of Paper, at 15 s. per Ream, what is the Lofs in the whole Quantity, at 4 per Cent. ? *Anfw.* 1 l. 16 s.

6. Bought 7 Tons of Wine, at 17 l. per Hbt. which I fell again at 1 s. per Pint ; I demand the whole Gain, and the Gain per Cent. ? *Anfw.* 229 l. 12 s. *whole Gain* ; and 48 l. 4 s. 8 d. 1 qr. $\frac{420}{470}$ the Gain per Cent.

7. If I fell 500 Deals at 15 d. a-piece, and 9 l. per Cent. Lofs ; what do I lofe in the whole Quantity ? *Anfw.* 2 l. 16 s. 3 d.

8. Bought 3 Oxen for 24 lb. 10 s. which I fell again for 2 s. per Stone ; what ought the 3 Oxen to weigh together, the Hides and Offal being the only clear Gain ? *Anfw.* 245 Stone.

9. A Draper bought 100 Yards of broad Cloth, for which he gave 56 l. I defire to know how he muft fell it per Yard, to gain 19 l. in the Whole ? *Anfw.* 15 s. per Yard.

10. a Draper bought 100 Yards of broad Cloth for 56 l. I demand how he muft fell it per Yard, to gain 15 l. in laying out 100 l. ? *Anfw.* 12 s. 10 d. 2 qrs. $\frac{24}{105}$.

Of FELLOWSHIP.

Q. HOW *many Sorts of* Fellowfhip *are there?*
     A. Two : *Single* and *Compound.*

Of SINGLE FELLOWSHIP.

Q. *What is* Single Fellowfhip ?
     A. *Single Fellowfhip* is when the Stocks of each Partner con-tinue for an equal Term of Time.

E   Q. *What*

Q. *What is the* Rule?

A.   As the *Sum* of the several *Stocks,*
       Is to the *Total Gain* or *Loss:*
       So is each Man's Share in *Stock,*
       To his *Share* of the *Gain* or *Loss.*

Q. *How is this* Rule *proved?*

A. Add all the *Share* together, and the *Sum* will be equal
to the given *Gain* or *Loss.*

Note, *This Way of proving Fellowship will not hold good always: For if
an Error should be committed in the Beginning of the Work, and carried on
thro' the whole Operation, yet the same will prove, tho' each Man's Share
of the Gain or Loss assigned him by that Operation, be either more or less
than his true Share. The most exact Method, then, that I would propose,
tho' something more tedious, is to change the Order of the Question, and put
each Man's Share of the Gain or Loss in the Place of his Stock first laid
out, and make the Sum of the Stocks stand in the Place of the whole Gain
or Loss, and then it will be,*

       As the *Total Gain* or *Loss,*
       Is to the *Sum* of the several *Stocks:*
       So is each Man's *Share* of the *Gain* or *Loss*
       To his particular *Share* in *Stock.*

Q. *What else doth this Rule belong to beside* Fellowship?

A. By it the Estate of a Bankrupt may be divided among
his Creditors: Also Legacies may be adjusted, when there is
a Deficiency of Assets or Effects.

EXAMPLES.

1. *A* and *B* were Sharers in a Parcel of Merchandize, in the
Purchase of which, *A* laid out 3 *l.* and *B* 7 *l.* and the Com-
modity being sold, they find their clear Gain amount to 25 *s.*
what Part of it must each Man have? *Answ. A must have
7 s. 6 d. and B 17 s. 6 d.*

2. *A, B,* and *C,* trading together, gain'd 120 *l.* which is
to be shar'd according to each Man's Stock; *A* put in 140 *l.*
B 300 *l.* and *C* 160 *l.* what is each Man's Share; *Answ.*
A 28 *l.* *B* 60 *l.* *C* 32 *l.*

3. Three Merchants trading to *Virginia,* lost Goods to the
Value of 800 *l.* Now if *A*'s Stock was 1200 *l.* *B*'s 4800 *l.*
and *C*'s 2000 *l.* what Sum did each Man lose? *Answ. A lost*
120 *l.* *B* 410 *l.* *C.* 200 *l.*

4. Three Merchants traded together, and they put into one
common Stock 1000 *l.* each Man, and gained 600 *l.* how much
must each Man have? *Answ.* 200 *l. each Man.*

5. Four Men traded with a Stock of 800 *l.* and they gain'd
in two Years Time twice as much and 40 *l.* over: *A*'s Stock
was 140 *l.* *B*'s 260 *l.* *C*'s 300 *l.* I demand *D*'s Stock, and what
each Man gain'd by Trading? *Answ. D's Stock was 100 l. and
A gain'd 287 l. B 533 l. C 615 l. and D 205 l.*   6. *A,*

6. *A*, *B*, and *C*, trading to *Guinea* with 480 *l*. 680 *l*. and 840 *l*. in three Years Time did gain 1010 *l*. how much is each Man's Share of the Gain? *Answ.* *A* 242 *l*. 8 *s*. *B* 343 *l*. 8 *s*. *C* 424 *l*. 4 *s*.

7. *A*, *B*, and *C*, freighted a Ship from the *Canaries* to *England*, with 108 Tons of Wine, of which *A* had 48; *B* 36; *C* 24; but by reason of bad Weather, they were obliged to cast 45 Tons overboard; how much must each Man sustain of the Loss? *Answ.* *A* 20 *Tuns*, *B* 15 *Tuns*, *C* 10 *Tuns*.

8. A Merchant is indebted to *S* 70 *l*. to *T* 400 *l*. to *V* 140 *l*. 12 *s*. 6 *d*. but upon his Decease, his Estate is found to be worth no more than 409 *l*. 14 *s*. how must it be divided among his Creditors? *Answ.* *S must have* 46 *l*. 19 *s*. 3 *d*. 3 *qrs*. $\frac{141750}{146550}$.

$$T \ - \ - \quad 268 \qquad 7 \quad 7 \quad 1 \qquad \tfrac{77250}{146550}.$$
$$V \ - \ - \quad \ \ 94 \qquad 7 \quad 0 \quad 2 \qquad \tfrac{74100}{146550}.$$

9. If the Mony and Effects of a Bankrupt amount to 1400 *l*. 14 *s*. 6 *d*. and he is indebted to *A* 742 *l*. 12 *s*. to *B* 641 *l*. 19 *s*. 8 *d*. and to *C*. 987 *l*. 19 *s*. 9 *d*. how must it be divided among them? *Answ.* *A must have* 438 *l*. 8 *s*. 4 *d*. 1 *qr*. $\frac{303527}{569417}$.

$$B \ - \ - \ - \quad 379 \quad 0 \quad 3 \quad 3 \qquad \tfrac{158361}{569417}.$$
$$C \ - \ - \ - \quad 583 \quad 5 \quad 9 \quad 3 \qquad \tfrac{107529}{569417}.$$

Of COMPOUND FELLOWSHIP.

Q. *What is* Compound Fellowship?

A. *Compound Fellowship* is when the *Stocks* continue an unequal Term of Time.

Q. *What is the* Rule?

A. 1. Multiply each Man's *Stock* and *Time* together.

2. Add the several *Products* thence arising together.

3. As the *Sum* of those *Products*,
   Is to the whole *Gain* or *Loss*:
   So is each *Product*,
   To its *Share* of the *Gain* or *Loss*.

Q. How is this Rule *proved?*

A. As in *Single Fellowship.*

EXAMPLES.

1. Three Merchants traded together: *A* put in 120 *l*. for 9 Months; *B* 100 *l*. for 16 Months; and *C* 100 *l*. for 14 Months; and they gain'd 100 *l*. how must it be divided? *Answ.* *A must have* 26 *l*. 9 *s*. 4 *d*. 3 *qrs*. $\frac{3820}{4080}$.

$$B \ - \ - \ - \quad 39 \quad 4 \quad 3 \quad 3 \qquad \tfrac{240}{4080}.$$
$$C \ - \ - \ - \quad 34 \quad 6 \quad 3 \quad 1 \qquad \tfrac{720}{4080}.$$

E 2

2. Three

2. Three Merchants join in Trade: *A* put in 400 *l.* for 9 Months; *B* 680 *l.* for 5 Months; and *C* 120 *l.* for 12 Months; but by Misfortune lost Goods to the Value of 500 *l.* what must each Man sustain of the Loss?

		l.	*s.*	*d.*	*qrs.*	
Answ.	*A must lose*	213	5	4	3	$\frac{2840}{8440}$.
	B ---	201	8	5	0	$\frac{7840}{8440}$.
	C ---	85	6	1	3	$\frac{6200}{8440}$.

3. *A*, *B*, and *C*, hold a Pasture in common, for which they pay 20 *l. per Annum*. In this Pasture *A* had 40 Oxen for 76 Days; *B* had 30 Oxen for 50 Days; and *C* had 50 Oxen for 90 Days. I demand what Part every of these Tenants ought to pay of the 20 *l.*?

		l.	*s.*	*d.*	*qrs.*	
Answ.	*A ought to pay*	6	10	2	1	$\frac{2340}{9140}$.
	B -----	3	17	1	0	$\frac{2000}{9140}$.
	C -----	9	12	8	2	$\frac{5000}{9140}$.

Of EXCHANGE.

Q. WHAT *is* Exchange;
A. *Exchange* is the giving the Mony, Weight, or Measure of one Country, for the like Value in Bills, Mony, Weight or Measure of another Country.

Q. *What is the* Course *of* Exchange?
A. It is the Value of Mony agreed on among Merchants.

Q. *Is the* Course *of* Exchange *always the same?*
A. No: The *Course* of *Exchange* rises or falls almost every Day, according as Mony is plenty or scarce? or according to the Time allowed for Payment of the Mony in *Exchange*; and then the Value is said to be above or under *Par*.

Q. *What is the* Par *of* Exchange?
A. It is the intrinsic Value of any Foreign Mony compared with Sterling Mony.

Q. *What is the* Agio?
A. It is a Term used in some Countries abroad, especially in *Italy*, but never in *England*; and signifies the Difference between the Value of Bank-Notes or Bank-Mony, and Current-Mony, in such Places; that is, it is the Difference between the best Mony used in the Terms of Exchange; and the worst used in Payment for Goods.

Q. *What is meant by* Bank-Notes *or* Bank Mony?
A. *Bank-Notes* are obtained from foreign Bankers, for Mony lodged in their Banks, which Mony is called *Bank-Mony*.

Q. *What is* Current-Mony?   A. It

A. It is fuch as paffes from Hand to Hand, in the receiving and paying fuch Sums as are due from one Man to another; commonly called *Running Cafh.*

Q. What is Ufance?

A. It is a certain Time allowed for the Payment of Bills of *Exchange*; but different according to the Ufage or Cuftom of the Place where the Bill is made, compared with the Diftance of that Place on which the Bill is drawn; that is, the nearer the Place, on which the Bill is drawn, is to the Place where it was drawn, the Time is the fhorter; but the farther thofe Places are from each other, the Length of Time allow'd for the Payment of that Bill, from the Date of it, is the greater.

Note, *Bills are payable five Ways, viz.*

1. *At* Sight.
2. *At fo many Days after* Sight.
3. *At* Ufance, *or a certain Length of Time agreed on between the two Places.*
4. *At* Double Ufance, *which is double the Time agreed on between the two Places.*
5. *At* Marts *or* Fairs; *which is to be underftood at fome certain Days accounted for Fairs in the faid Places where the Bills are made payable.*

Q. What are Days of Grace?

A. In *London* it is cuftomary to allow three Days to the Time mentioned in the Bill, which are called Days of Grace, on the laft Day of which (if it be not on a *Sunday*, but if it is, on *Saturday*) the Bill muft be demanded, and if not then paid, muft be immediately protefted.

Note, *In fome Places they allow a larger Number of Days of* Grace, *than we do at* London; *and in others none at all.*

Q. How are Queftions in Exchange *proved?*

A. By changing the Order of them.

CASE I.

Q. What Places does London *exchange with in* Dollars, *or Pieces of* Eight *of* Mexico?

A. With *Madrid* and *Cadiz* in *Spain*, and with *Genoa*, and *Leghorn* in *Italy*.

Q. How do they keep their Accompts in Spain?

A. In *Rials* and *Marvedies.*

Note, 372 *Marvedies make* 1 *Rial.*
8 *Rials* —— —— 1 *Piece of Eight.*

Q. What is the Par *of* Exchange *between* London *and* Spain?

A. The *Par* of the Mony between *London* and *Spain*, is, that 1900 Rials are exactly equal to 51 *l.* Sterling; confequently 1 Rial is worth 6 *d.* 1 *qr.* $\frac{73}{95}$.

Note 1, *Spain gives to* London 1 *Dollar or Piece of Eight for an uncertain Number of Pence Sterling.*

2. *In* Spain *they allow* 14 *Days of Grace.*

E 3

Q. How

Q. *How do they keep their Accompts in* Italy ?

A. In *Livres, Sols,* and *Deniers* ; fome few Cities excepted.

Note 1.　　12 *Deniers make* 1 *Sol.*
　　　　　　20 *Sols* ———— 1 *Livre,*
　　　　　　5 *Livres* ———— 1 *Piece of Eight at* Genoa.
　　　　　　6 *Livres* ———— 1 *Piece of Eight at* Leghorn.

2. *The* Ufance *of* Genoa *to* London *is* 3 *Months after Date.*

3. *At* Genoa *they allow* 30 *Days of Grace.*

EXAMPLES.

1. What is the Amount of 63 *l.* Sterling in Pieces of Eight, at 56 *d.* per Piece ? *Anfw.* 270 *Pieces of Eight.*

2. A Factor hath fold Goods at *Cadiz* for 1468 Pieces of Eight, at 4 *s.* 6 *d.* 2 *qrs.* per Piece ; how much Sterling is the Sum ? *Anfw.* 333 *l.* 7 *s.* 2 *d.*

A Bill of Exchange, *viz.* *Leghorn* on *London.*

Leghorn, *July* 31, 1769, for 786 Pieces of Eight of *Mexico,* at 55 *d.* Sterling *per* Piece of Eight, at 3 Months.

Three Months after Date, pay this my firft of Exchange to Mr. *James La Morte,* or Order, Seven Hundred and Eighty-fix Pieces of Eight of *Mexico,* for the Value received of him-felf, at 55 *d.* Sterling *per* Piece, and place it to Accompt, as *per* Advice from

　　　　　　　　　　Your humble Servant,

To Mr. *William Mayhew,*
　Merchant in *London.*　　　　　　　*James Douglas.*

How much Mony muft be received in *England* for this Bill ? *Anfw.* 180 *l.* 2 *s.* 6 *d.*

CASE 2.

Q. *What Places does* London *exchange with in* Ducats ?

A. With *Venice* in *Italy.*

Note, 6 *Solidi make* 1 *Grofs.*
24 *Groffes* — 1 *Ducat.*

Q. *What is the Par of* Exchange *between* London *and* Venice ?

A. One Hundred Livres are worth three Pounds Sterling.

Q. *How many Sorts of Ducats are there at* Venice ?

A. Two Sorts, *viz.* Ducats *Banco,* or Bank-Ducats, which are ufually given in Exchange ; and Ducats *Picoli,* or Current Ducats, which are ufually bargained for and paid in the Pur-chafe of Goods and Merchandizes, and are 20 *per Cent.* worfe than the Bank-Ducats.

Note 1. *The Par of the Ducat Banco, is* 52 *Pence Sterling ; and the Par of the Ducat Picoli is* 40 *d. Sterling.*

2. *The* Ufance *of* Venice *to* London *and back again is* 3 *Months, or* 90 *Days after Date :* Two Ufance *is that Time doubled.*

EXAMPLES.

1. If 100 Livres are worth 3 *l.* Sterling, what is 1 Livre worth ? *Anfw.* 7 *d.* ⅓ Sterling.　　　　　　　2. There

2. There are 2000 Ducats, at 4 *s.* 4 *d.* each, remitted to *London,* to be paid in Pounds Sterling; what is the Amount? *Answ.* 433 *l.* 6 *s.* 8 *d.*

3. A Bill of 100 *l.* Sterling is remitted to *Venice,* to be paid in Ducats, at 4 *s.* 4 *d.* each; what is the Amount? *Answ.* 461 $\frac{28}{52}$ *Ducats.*

4. A Traveller would exchange 233 *l.* 16 *s.* 8 *d.* Sterling, for *Venice* Ducats, at 4 *s.* 9 *d. per* Ducat; how many must he have? *Answ.* 984 $\frac{32}{57}$ *Ducats.*

<center>A Bill of Exchange, <i>viz. Venice</i> on <i>London.</i></center>

Venice, August 17th, 1769, for 4000 Ducats *Banco,* at 54 *d.* ¼. Sterling *per* Ducat, at *Usance.*

At *Usance,* pay this my first Bill of Exchange, to Mr. *Abraham Jenning ,* or Order, Four Thousand Ducats, at fifty-four Pence Farthing Sterling *per* Ducat, Value received; and place it to the Accompt of

To *Samuel Jones,* Esq;   Your humble Servant,
  Merchant in *London.*
                                    William Sherston.

I demand the Value of this Bill in Sterling Mony? *Answ.* 904 *l.* 3 *s.* 4 *d.*

<center>Another, <i>viz. London</i> on <i>Venice.</i></center>

London, September 14, 1769, for 904 *l.* 3 *s.* 4 *d.* Sterling, to be paid at *Venice,* in Ducats, at 54 *d.* ¼ Sterling *per* Ducat *Banco* at *Usance.*

At Usance, pay this my second Bill of Exchange, my first not paid, to Mr *Samuel Dobbins,* or Order, Nine Hundred and four Pounds, three Shillings and four Pence Sterling, in Ducats, at fifty-four Pence Farthing *per* Ducat, Value in myself, and place it to Accompt, as *per* Advice from

To Mr. *James Torriano,*   Your humble Servant,
  Merchant at *Venice.*
                                    Michael Taffio.

What is the Value of this Bill in Ducats Banco? *Answ.* 4000 *Ducats.*

<center>C A S E 3.</center>

Q. *What Places does* London *exchange with for* French Crowns?
A. With *Paris, Lyon , Rouen, &c.* in *France.*
Q. *How do they keep their Accounts in* France?
A. In *Livres, Sol,* and *Deniers*

Note 1.   12 *Deniers make* 1 *Sol.*
             20 *Sols* ——— 1 *Livre.*
             8 *Livres* ——— 1 *Crown.*

   2. *The Livre is imaginary.*
   3. *By an Order of* Lewis XV. *their Mony is brought to the* English *Standard, for the Benefit of Trade.*

<center>E 4   . Q. <i>What</i></center>

Q. What is the Par *of* Exchange *between* London *and* France ?

A. One Livre is worth 18 *d.* Sterling ; and one Crown is worth 4 *s.* 6 *d.* Sterling.

Note, *In* France *they allow* 10 Days *of* Grace ; *but when Bills are drawn at Sight, they are payable the fame Day.*

2. *The* Ufance *between* France *and* London *is one* Month, *confifting of* 30 Days.

EXAMPLES.

1. A Bill of 200 *l.* is remitted to *Paris* by a Merchant in *London* ; what is the Value in *French* Crowns, at 4 *s.* 6 *d.* each ? *Anfw.* 888 $\frac{48}{54}$ Crowns.

2. There are 800 *French Crowns*, at 4 *s.* 6 *d.* each, remitted to *London* by a Merchant in *Paris* ; what is the Value in Pounds Sterling ; *Anfw.* 180 *l. Sterling.*

A Bill of Exchange, *viz. Paris on London.*

Paris, September 17, 1769, for 1000 Crowns, at 4 *s.* 2 *d.* at 2 Ufance.

At double Ufance, pay this my fecond Bill of Exchange, my firft not paid, to Mr. *James Jackson*, or Order, the Sum of One Thousand Crowns, at four Shillings and two Pence *per* Crown, Value received, and place it to Accompt, as *per* Advice of

Your humble Servant,

To Mr. *Simon Surepay,*
　　　London.

Daniel Abbott.

What is the Value of this Bill in Sterling Mony ? *Anfw.* 208 *l.* 6 *s.* 8 *d.*

CASE 4.

Q. What Places does London *exchange with for* Mill-Reas ?

A. With *Oporto* and *Lisbon, &c.* in *Portugal* ; and with the Ifland of *Madeira.*

Q. How do they keep their Accompts in Portugal.

A. In *Reas.*

Note 1. 1000 *Reas make* 1 *Mill-Rea.*

2. *They feparate the* Reas *from the* Mill-Reas *by fome particular Mark, thus,* 687 ❍ 496, *that is,* 687 *Mill-Reas, and* 496 *Reas, which is the fame with* 687496 *Reas.*

3. *Very near* 14 *Reas, or* 13 $\frac{1}{2}$ *Reas make* 1 *Penny Englifh.*

Q. What is the Par *of* Exchange *between* London *and* Portugal ?

A. One *Mill-Rea* is worth 5 *s.* 7 *d.* $\frac{1}{2}$, which appears thus ;

800 Reas (or 8 Teftoon Piece) are =	4 *s.*	6 *d.*	
200 Reas (or fourth Part) are =	1	1 $\frac{1}{2}$	
1000		5	7 $\frac{1}{2}$

Note, *The* Ufance *between* London *and* Portugal *is two Months, or* 60 Days *after Date.*

EXAMPLES.

EXAMPLES.

1. If a Bill is drawn from *Lisbon* of 1432 Mill-reas, at 6 s. 8 d. *per* Piece; how much *English* Mony is that Bill? *Answ.* 477 *l.* 6 *s.* 8 *d.*

2. If a Bill be drawn from *London* of 1333 *l.* 6 *s.* 8 *d.* Sterling, how much is it at *Lisbon* in Mill-reas, at 6 *s.* 8 *d.* each? *Answ.* 4000 *Mill-reas.*

A Bill of Exchange, *viz. Lisbon* on *London.*

Lisbon., October 14, 1769, for 4761 ℮ 764, at 5 *s.* 8 *d.* at Usance.

At Usance pay this my first of Exchange to Mr. *Henry Sozomon,* or Order, Four Thousand Seven Hundred and Sixty-one Mill-reas, Seven Hundred and Sixty-four Reas, at five Shillings and eight Pence Sterling *per* Mill-rea, Value receiv'd; and place it to the Accompt of

To Mr. *Jacques Jolliffe,*   Your humble Servant,
   Merchant in *London.*   *John Minors.*

What is the Value of this Bill in Sterling Mony? *Answ.* 1349 *l.* 3 *s.* 3 *d.* 3 *qrs.* $\frac{808}{1005}$.

CASE 5.

Q. What Place does London *exchange with for* Ducatoons, Crowns *or* Ecues?

A. With *Florence* in *Italy.*

Q. How do they keep their Accompts in Florence.

A In *Ecues, Sols,* and *Deniers* Picoli or Current.

Note, 12 *Deniers make* 1 Sol.
       20 *Sols* ——— 1 Ecu, Crown or Ducatoon.

Q. What is the Par *of Exchange between* London *and* Florence?

A. One *Ecu, Crown* or *Ducatoon* is worth 60 *d.* Sterling

Note, *The* Usance *between* Florence *and* London *is* 3 *Months, or* 90 *Days after Date.*

EXAMPLES.

1. A Bill of 120 Ducatoons is remitted from *Florence,* at 53 *d.* each; what is the Value in Pounds Sterling? *Answ.* 26 *l.* 10 *s.*

2. A Bill of 220 *l.* 16 *s.* 8 *d.* is drawn from *London,* what is the Value at *Florence* in Ducatoons, or Ecues, at 53 *d.* ½ each? *Answ.* 990 $\frac{70}{107}$ *Ecues.*

A Bill of Exchange, *viz. Florence* on *London.*

Florence, October 19, 1769, for 1876 Ecues, at 63 *d.* Sterling *per* Ecu, at Usance.

At Usance, pay this my third of Exchange, my first and second not paid, to Mr. *Jonathan Farmento,* or Order, One Thousand Eight Hundred and Seventy-six Ecues, at 63 *d.* Sterling *per* Ecu, Value receiv'd, and place it to the Accompt of

To Mr. *John Jameson,*   Your humble Servant,
   Merchant in *London.*   *Michael Toffiani.*

What is the Value of this Bill in Sterling Mony ? *Answ.*
492 *l.* 9 *s.*

C A S E 6.

Q. What Place does London *exchange with for* Florins ?
A. With *Frankfort* in *Germany.*
Q. How do they keep their Accompts in Frankfort ?
A. In *Goulds, Cruitzers* and *Deniers,* or *Fennings.*
Note, 8 *Fennings,* or 4 *Deniers make* 1 *Cruitzer.*
   60 *Cruitzers* ——— ——— 1 *Gould, or Guilder.*
Q. What is the Par of Exchange between London *and* Frank-
fort ?
A. Twenty Florins are equal to 3 *l.* Sterling.
Note, *When they exchange or negociate Bills for* London, Holland *or* Fland-
ers, *the Bills are paid in* Goulds *of* 65 Cruitzers ; *and for* France, Ham-
burgh *and* Italy, *in* Goulds *of* 60 Cruitzers ; *and sometimes in* Rix-
Dollars *at* 4 *s.* 6 *d.* Sterling, *and at so much* per Cent. *Profit or Loss.*

E X A M P L E S.

1. If 20 Florins are equal to 3 *l.* Sterling, what is the
worth of 1 Florin ? *Answ.* 3 *s.* Sterling.
2. If 1000 *l.* Sterling be remitted to *Frankfort.* what is the
Value in Florins at 39 *d.* per Piece ? *Answ.* 6153 $\frac{33}{39}$.
3. If 100 Florins at 40 *d.* $\frac{1}{2}$ each, be remitted from *Frank-
fort* to *London,* what is the Value in *l.* Sterling ? *Answ.* 16 *l.*
17 *s.* 6 *d.*

A Bill of Exchange, *viz. London* on *Frankfort.*
London, September 12, 1769, for 763 *l.* 10 *s.* Sterling, to be
   paid in *Florins* at 41 *d.* Sterling each, at Usance.
At Usance, pay this my second of Exchange, my first not
paid, to Mr. *Jacobus Sanderson,* or Order, Seven Hundred
Sixty-three Pounds, ten Shillings Sterling, in Florins at 41 *d.*
Sterling *per* Florin ; Value received ; and place it to Accompt
as *per* Advice from

| | Your humble Servant, |

To Mr. *William Maron,*
 Merchant in *Frankfort.*   *James Johnson.*

What is the Value of this Bill in Florins ? *Answ.* 4469 $\frac{11}{41}$
Florins.

C A S E 7.

Q. What Places does London *exchange with by the* Pound
Flemish *or* Pound Sterling ?
A. With *Antwerp, Brussels, Amsterdam, Rotterdam,* and all
Parts of the *Spanish* and *United Provinces.* Also with *Hamburgh*
in *Germany.*

Q. *How*

Q. *How do they keep their Accompts in these Places?*
A. Some in Pounds, Shillings and Pence, as in *England*;
and others in Guilders, Stivers and Pennies.

Note 1.　　16 *Pennies make* 1 *Stiver.*
　　　　　20 *Stivers* — 1 *Guilder. Also*
　　　　　6 *Stivers* — 1 *Shilling.*
　　　　　6 *Guilders* — 1 *Pound Flemish.*

2. *The Par of Exchange between* London *and* Holland *is, that* 9 *l.* Sterling *are equal to* 100 *Florins.*

3. *A Florin is worth* 3 *s.* 2 *d.* $\frac{2}{5}$ *Flemish.*

4. *The Prices of the Exchange at* London, Hamburgh, *and* Amsterdam, *are said to have a very great Influence upon all the rest of Europe.*

Q. *What is the* Par *of* Exchange *between* London *and* Antwerp?
A. Sixteen Pounds Flemish are equal to Nine Pounds Sterling: So that 1 *l.* Flemish is equal to 11 Shillings and 3 Pence Sterling, and 1 *l.* Sterling is equal 35 *s.* 6 *d.* $\frac{2}{3}$ Flemish.

E X A M P L E S.

1. Being desirous to remit to my Correspondent at *London*, the Sum of 2000 *l.* 12 *s.* 6 *d.* Flemish, to dispose of according to my Order, Exchange at 34 *s.* 6 *d.* Flemish *per* Pound Sterling; how much Mony Sterling shall I be Creditor for in the City of *London* aforesaid? *Answ.* 1159 *l.* 15 *s.* 7 *d.* 3 *qrs.* $\frac{126}{414}$.

2. My Correspondent in *England* gives me Notice that he has disbursed in Merchandize, upon my Account, the Sum of 1000 *l.* Sterling: what Sum must I answer for that in *Holland*, the Course of Exchange being at 33 *s.* 4 *d.* Flemish for one Pound Sterling? *Answ.* 1666 *l.* 13 *s.* 4 *d. Flemish.*

Note, *When the Course of Exchange is at 33 s. 4 d. Flemish for 1 Pound Sterling, then to bring Flemish Mony into English Mony, multiply the Flemish Mony by 3, and divide that Product by 5, the Quotient will give the Answer in Pounds Sterling: And the Contrary.*

3. My Correspondent in *Rotterdam* sends me Word, that he has disbursed upon my Account, the Sum of 3060 Guilders and 15 Stivers; what Sum must I answer for that at *London*, the Course of Exchange being at 37 *s.* 9 *d.* Flemish *per l.* Sterling? *Answ.* 270 *l.* 5 *s.* 3 *d.* 1 *qr.* $\frac{188}{453}$.

Note, *A Stiver is 2 d. Flemish, and a Guilder 40 d.*

4. A Merchant delivered at *London* 120 *l.* Sterling, to receive 147 *l.* Flemish in *Amsterdam*; how much was 1 *l.* valued at in Flemish Mony? *Answ.* 1 *l.* 4 *s.* 6 *d.*

5. If 1 Florin is worth 3 *s.* 2 *d.* $\frac{2}{5}$ Flemish, and 100 Florins are equal to 9 *l.* Sterling, how much is the real Worth of 1 *l.* Sterling in Flemish Mony? *Answ.* 35 *s.* 6 *d.* $\frac{6}{7}$.

　　1 *fl.* : 3 *s.* 2 *d.* $\frac{2}{5}$: : 100 *fl.* : 16 *l.* Flem.
　　9 : 16 : : 1 : 35 *s.* 6 *d.* $\frac{6}{7}$ Flem.

Of

Of reducing the Current Mony of Holland into Bank-Mony; and the Contrary.

EXAMPLES.

1. Being in *Holland*, I have 1000 Guilders, current Mony, which I would turn into Bank-Mony, the Agio being at 5 Guilders *per Cent.* how much is it? *Answ.* 952 *Guilders Banco*, $\frac{40}{105}$.

G.Cur.   G.B.   G.Cur.   G.B.
105 : 100 : : 1000 : 952 $\frac{40}{105}$.

2. My Correspondent in *Amsterdam* having wrote me Word that he had by him of mine 2763 Guilders, 15 Stivers, Currency, I have directed him to turn the same into Bank-Mony, the Agio being (as I am informed) 5 Guilders $\frac{1}{2}$ *per Cent.* I demand how much Bank-Mony it will make? *Answ.* 2619 Guilders 13 $\frac{77}{211}$ *Stivers, Bank-Mony.*

G.Cur.   G.B.   G. S.Cur.   G.B.   S.
105$\frac{1}{2}$: 100 : : 2763 ,, 15 : 2619   13 $\frac{77}{211}$

3. *Holland* is indebted to *London* 7681 Guilders, Current Mony, and would know how much Sterling it will amount to, Exchange at 35 *s.* 6 *d.* Banco *per l.* Sterling, Agio at 5 *per Cent.* How much is it? *Answ.* 686 *l.* 17 *s.* 6 *d.* $\frac{60}{420}$ *Sterling.*

G.C.   G.B°   G.C.   G.B° St.   Pen.
105 : 100 : : 7681 : 7315   4   12 $\frac{20}{105}$

s.   *d.*   *l.St.*   G.B° S.   P.
35 6 : 1 : : 7315 5 12 : 686 *l.* 17 *s.* 6 *d.* 1 *qr.* $\frac{2152}{3168}\frac{60}{420}$.

4. *Amsterdam* remits to *London* 1090 Guilders, 17 $\frac{1}{2}$ Stivers, at 33 *s.* 8 *d.* Banco *per l.* Sterling: What will this Remittance amount to at *London* in Sterling Mony? *Answ.* 108 *l.* 0 *s.* 1 *d.* 3 *qrs.* $\frac{52}{404}$ *Sterling.*

Note, *The above Mony is supposed to be reduced into Bank-Mony already.*

s.   *d.*   *l.St.*   G.   St.B°   £.   *s.*   *d.*   *qrs.*
33 8 : 1 : : 1090 ,, 17$\frac{1}{2}$: 108   0   1   3 $\frac{52}{404}$.

Of the Sale of Gold in Holland.

Note, *All Gold is bought and sold at Amsterdam by Weight; that is,* 355 *Guilders Current per Mark of that Weight.*

EXAMPLES.

A Merchant in *London* sends over to his Correspondent at *Amsterdam*, 1000 Moidores, valued at 27 *s.* Sterling each, the Charges on Shipping came to 5 *l.* 19 *s.* 6 *d.* when they came to the Place consign'd, and were weighed, they amounted to 14209 Guilders, 14 Stivers Currency, all Charges there deducted; I demand what was their Value in *English* Mony,

and

and how much the *London* Merchant gained or lost by his Moidores, admitting the Agio to be 5 Guilders *per Cent.* and the Course of Exchange 34 s. 6 d. B° Flemish *per l.* Sterling ? *Answ.* 12 l. 15 s. 4 d. *loss.*

1.   1000 Ms + 5 l. 19 s. 6 d. = 1355 l. 19 s. 6 d.
    G.   G.   G.   St.   G. St.
2.   100 : 5 : : 14209 ,, 14 : 710 9
    Gu.   St.   Gu.   St.   Gu.   St.
3. 14209 ,, 14 — 710 ,, 9 = 13499 ,, 5
    s.   d.   l.   G.   S.   l. s. d.
4.   33   6 : 1 : : 13499 ,, 5 : 1343   4   2
5.   1355 l. 19 s. 6 d. — 1343 l. 4 s. 2 d. = 12 l. 15 s. 4 d.

A Bill of Exchange, *viz. London* on *Rotterdam.*

London, September 14, 1769, for 436 l. 17 s. Sterling, at 34 s. 6 d. Flemish *per l.* Sterling, at Usance.

At Usance, pay this my first of Exchange, to *Jacob Van Hoove,* or Order, Four Hundred thirty-six Pounds, seventeen Shillings Sterling, Value received of *William Johnson,* Esq; and place it to Accompt, as *per* Advice from

To Mr. *James Juliers,*   Your humble Servant,
  Merchant, *Rotterdam.*   *Thomas Cartwright.*

What is the Value of this Bill in Flemish Mony ? *Answ.* 753 l. 11 s. 3 d. $\frac{18}{20}$.

Also in Guilders and Stivers ? *Answ.* 4521 Guil. 7 Stiv.

s.	d.		l.	s.
34	6		436	17
12				414
414			1747	8
			4363	5
			174740	0

                  Gu. St.
      40)1808515 13(4521   7 *Answ.*
           15

Another, *viz. Rotterdam* on *London.*

Rotterdam, September 19, 1769, for 7693 Guilders, 17 Stivers, at 35 s. 6 d. Flemish *per l.* Sterling.

At Usance, pay this my second Bill of Exchange, my first not paid, to *James Truelove,* or Order, Seven Thousand, six Hundred ninety-three Guilders, seventeen Stivers, at 35 s. 6 d. Flemish *per l.* Sterling, Value received of *Jaques Jacobson,* and place it to Accompt, as *per* Advice from

To *James Jolles,* Esq;   Your humble Servant,
  Merchant at *London.*   *Johannes Van Schooten.*

What is the Value of this Bill in Sterling Mony ? *Answ.* 722 l. 8 s. 6 d. 2 qrs. $\frac{60}{426}$.

                                 To

To know how much is gain'd or loft per Cent. on the rifing or falling of the Price of Exchange.

EXAMPLES.

1. *London* draws upon *Holland* for any Sum of Mony, Exchange at 35 *s*. 6 *d*. Flemifh *per l* Sterling: In three Weeks or one Month afterward, London draws on *Holland* again, Exchange at 34 *s*. 6 *d*. I demand what London gains *per Cent.* by this Negotiation? *Anfw.* 2 *l*. 17 *s*. 11 *d*. 2 *qrs*. $\frac{252}{414}$ Gain.

s.   d.   s.   l.   l.   s.   d.
34   4 : 1 : : 100 : 2 17 11 2 qrs. $\frac{252}{414}$.

2. *London* draws upon *Amfterdam*, Exchange at 34 *s*. 6 *d*. Flemifh *per l*. Sterling: And in five Weeks time draws again, the Exchange being at 35 *s*. 6 *d*. how much is loft *per Cent.* by this Transaction? *Anfw.* 2 *l*. 17 *s*. 11 *d*. 2 qrs. $\frac{252}{414}$.

Note, Hence it is to be obferved, that the lower the Price of Exchange is, the greater is the Gain at London; and the Contrary when it is higher: But the Cafe is juft the Reverfe at Holland.

'CASE 8.

Q. *What Places does* London *exchange with by the Pound Sterling, or Pound Currency?*

A. In all the *Britifh* Dominions in *America*, in the *Weft Indies*, and in *Ireland*.

Q. *How do they keep their Accompts in thefe Places?*

A. As they do in *London*, that is, in Pounds, Shillings, Pence and Farthings; but with this Difference, that in *London* they call their Mony Sterling, but in all the Weftern Dominions they call it Currency.

Q. *Why is the Mony called* Currency *in the* Weftern *Dominions?*

A. Becaufe they have very few Coins of any Sort circulating among them; excepting in the *Englifh* Iflands there; and therefore are obliged to deal in, what they call *Paper-Mony.*

Note 1. Notes of Hand pafs commonly among the People; and in New England they are faid to be given for fo fmall a Sum as five Shillings. Now as this Paper-Mony is fubject to many Cafualties, it caufes a very great Undervalument of their Currency, and is fometimes, and in fome Places, at 6 or 700 Pounds Currency for 100 Pounds Sterling, or Mony that is good Silver or Gold.

2. In all the Englifh Iflands in the Weft Indies, they have fo great a Plenty of foreign Coins, that their Currency is fometimes at no greater Difcount than 25 per Cent. or 125 *l*. Currency for 100 *l*. Sterling, and feldom more than 50 per Cent.

3. The Weights and Meafures, in the Britifh Colonies and Plantations, are the fame as thofe in London, differing only in their Kinta's or Hundred Weight; their Hundred being only 100 *lb*. Avoirdupois, and that at London 112 *lb*.

Q. *What*

Q. *What foreign Coins usually pass in the* British *Colonies and* Plantations ? ·

A. These following ; the Values of which were ascertained by an Act of Parliament made in the sixth Year of Queen *Ann.*

	Weight.		True Val.		Curr. Value.		
	dwt.gr.		s.	d.	s.	d.	f.
Pieces of Eight (old Plate of *Seville*)	17	12	4	6	6	0	0
Ditto of new – – – – – – –	14	0	3	$7\frac{1}{4}$	4	9	$2\frac{2}{3}$
Mexico ditto – – – – – –	17	12	4	6	6	0	0
Piller ditto – – – – – –	17	12	4	$6\frac{3}{4}$	6	0	0
Peru ditto (old Plate) – – –	17	12	4	5	5	10	$2\frac{2}{3}$
Cross Dollars – – – – – –	18	0	4	$4\frac{3}{4}$	5	10	$1\frac{1}{3}$
Ducatoons of *Flanders* – – –	20	21	5	6	7	4	0
French Crowns or Ecues – – –	17	12	4	6	6	0	0
Crusadoes of *Portugal* – – –	11	4	2	$10\frac{1}{4}$	3	9	$2\frac{2}{3}$
Three Guilder Pieces of *Holland* –	20	7	5	$2\frac{1}{4}$	6	10	$3\frac{2}{3}$
Old Rix Dollars of the Empire –	18	10	4	6	6	0	0

Note 1. Pieces *of the same* Weight, *and not of the same* Value, *may be presumed to be occasioned by the Difference of* Fineness.

2. *To remedy the Inconveniencies, which were caused by the different Rates at which Pieces of the same Species were current, it was ordered by Proclamation, and confirmed by the aforementioned Act of Parliament, that after the first Day of* January, 1704, *no* Piller, Mexico, *or* Seville *Pieces of* Eight, *tho' of full Weight as above, shall be received nor paid at above six Shillings a-piece ; and the* Halves, Quarters, *and other lesser Pieces in Proportion. And the said Act enjoins,* That if any one shall receive or pay any of the said Pieces for any more than as above specified, such Person shall forfeit Ten Pounds.

EXAMPLES.

1. A Merchant in *New England* stands indebted to his Correspondent in *London*, in 4960 *l.* 17 *s.* 6 *d.* Currency ; what Sum must he answer for that at *London* aforesaid, when the Currency is at 300 *per Cent. ? Answ.* 1653 *l* 12 *s.* 6 *d. Sterling.*

2. My Correspondent in *Georgia* stands indebted to me for Merchandize, in the Sum of 120 *l.* 6 *s.* 9 *d.* $\frac{1}{2}$ Sterling ; how much is that in their Currency, at 500 *per Cent ? Answ.* 601 *l.* 13 *s.* 11 *d.* $\frac{1}{2}$ *Currency.*

3. Trading to *Jamaica*, my Employer there owes me 176 *l.* 12 *s.* 8 *d.* Sterling, how much is that in their Currency, at 25 *per Cent. ? Answ.* 220 *l.* 15 *s.* 10 *d. Currency.*

4. I have lately purchased in *Ireland*, Effects to the Value of 400 *l.* 17 *s.* 9 *d.* of that Place ; what Sum must I answer for that at *London*, Exchange at 10 *per Cent. ? Answ.* 364 *l.* 8 *s.* 10 *d.* 1 *qr.* $\frac{120}{264}$.

5. My Correspondent at *London*, draws upon me for 364 *l.* 8 *s.* 10 *d.* $\frac{1}{2}$ Sterling ; what Sum must I answer for that at *Dublin,* Exchange at $8\frac{1}{2}$ *per Cent. ? Answ.* 395 *l.* 8 *s.* 5 *d* $\frac{1464}{9600}$.

C A S E 9.

Q. *What Place does* London *exchange with for their Crown or Rix Dollar?*

A. With Geneva in Switzerland.

Q. *How do they keep their Accompts in* Geneva?

A. In *Livres,* Sols *and* Deniers.

Note 1,　　　12 Deniers make 1 Sol.
　　　　　　　20 Sols ——— 1 Livre.
　　　　　　　3 Livres——— 1 Rix Dollar.

2. *The Par is, that 1 Rix-Dollar is equal to 4 s. 6 d. Sterling ; but in Exchange it goes for 50 d. to 60 d. Sterling.*

E X A M P L E S.

1. London draws upon Geneva for 796 *l.* 10 *s.* 6 *d.* Sterling ; what Sum does that amount to in Rix-Dollars, at 53 *d. per* Dollar ? *Answ.* 3606 $\frac{48}{53}$ *Rix Dollars.*

2. A Merchant in Geneva draws upon his Correspondent at London, for 1960 Livres, Exchange at 56 *d. per* Rix Dollar ; how much Sterling must be paid at London to answer that Bill ? *Answ.* 152 *l.* 8 *s.* 10 *d.* $\frac{1}{2}$.

$\frac{1960}{3} = 653\frac{1}{3}$　1 : 56 : : 653$\frac{1}{3}$: 152 *l.* 8 *s.* 10 *d.* $\frac{1}{2}$ $+$

A Bill of Exchange, *viz.* London on Geneva.

London, October 19. 1769, for 376 *l.* 11 *s.* 8 *d.* Sterling, to be paid in Rix Dollars, at 58 *d.* Sterling each, at Usance.

At Usance, pay this my only Bill of Exchange to Mr. *Jansen Gramonville,* or Order, Three Hundred Seventy-six Pounds, eleven Shillings and eight Pence, Sterling, in Rix-Dollars, at 58 *d.* Sterling *per* Rix Dollar, Value received, and place it to the Accompt of

To Mr. *Abraham Schulhausen,*　　　Your humble Servant,
　　Merchant in Geneva.　　　　　　　*Jacobus Schomberg.*

What is the Value of this Bill in Rix Dollars ? *Answ.* 1558 $\frac{16}{58}$ *Rix Dollars.*

C A S E 10.

Q. *What particular Piece of Mony does* London *Exchange with* Denmark *for?*

A. For Rix Dollars ; one being valued at about 4 *s.* 6 *d.* Sterling.

Q. *How do they keep their Accompts in* Denmark?

A. In Marks and Shillings.

Note 1,　　　16 Shillings make 1 Mark.
　　　　　　　6 Marks ——— 1 Rix Dollar.

2. *The Rix Dollar, in Exchange, goes for 45 d. to 58 d. Sterling.*

E X A M P L E S.

1. London draws on Copenhagen in Denmark for 184 *l.* 16 *s.* 7 *d.* Sterling ; what Sum must be answer'd for that in Rix-Dollars, at 50 *d.* each ? *Answ.* 887 $\frac{9}{50}$ *Dollars.*　　　2. My

2. My Correspondent in *London*, stands indebted to me, according to my Books, in the Sum of 1000 Rix Dollars, what Sum must he answer for that at *London* aforesaid, when the Rix Dollar, by way of Exchange, is valued at 58 *d*. $\frac{1}{2}$? *Answ.* 243 *l*. 15 *s*.

3. A Merchant in *London* draws upon his Correspondent in *Copenhagen*, for 400 *l*. Sterling, but will give no more for a Rix Dollar than 55 *d*. Sterling, that being the Price of Exchange; how many Rix Dollars must he receive, and what is his whole Loss, and the Loss *per Cent.* they being above Par? *Answ.* 1745 $\frac{25}{55}$ *Rix Dollars: The whole Loss was* 7 *l*. 5 *s*. 3 *d*. *and the Loss per Cent. was* 1 *l*. 16 *s*. 3 *d*. $\frac{3}{4}$.

     d.   Dol.   *l.*   Dol.

55 : 1 : : 400 : 1745 $\frac{25}{55}$.

1745 $\frac{1}{2}$ at 4 *s*. 6 *d*. = 392 *l* 14 *s*. 9 *d*. *at Par.*

400 *l*. — 392 *l*. 14 *s*. 9 *d*. = 7 *l*. 5 *s*. 3 *d*. *loss.*

$\frac{2\ 5\ 3}{4}$ = 1 *l*. 16 *s*. 3 *d*. $\frac{1}{4}$ *Loss per Cent.*

C A S E   II.

Q. What Place does London *exchange with for the Copper Dollar?*
A. With *Stockholm* in *Sweden.*
Q. How do they keep their Accompts in Stockholm?
A. In Rix Dollars, Copper-Dollars, and Runstics.

Note 1   32 *Runstics make* 1 *Copper-Dollar.*
           6 *Copper-Dollars* 1 *Rix-Dollar.*

2. *The Par of the Rix Dollar is equal to about* 6 *s. Sterling; consequently the Par of the Copper Dollar is equal to* 1 *s. Sterling, or* 20 *Copper-Dollars make* 1 *l. Sterling, tho' the Course of Exchange is sometimes to 28 or 30 Copper-Dollars per l. Sterling.*

3. *In* England *Sums of Mony are paid in the best Specie, viz.* Guineas, *by which Means* 1000 *l. or more may be put into a small Bag, and conveyed away in the Pocket: but in* Sweden *they often pay Sums of Mony in Copper, and the Merchant is obliged to send Wheelbarrows instead of Bags to receive it.*

E X A M P L E S.

1. A Merchant in *Stockholm* draws upon his Correspondent in *London*, for 1184 Rix Dollars; what Sum must he answer for that in *London* aforesaid, when the Course of Exchange is at Par? *Answ.* 355 *l*. 4 *s*.

2. *Stockholm* draws upon *London* for 1276 Rix Dollars; what Sum must *London* answer for that, Exchange at 25 Copper-Dollars *per l*. Sterling, and what is gained or lost by the Drawer at *Stockholm* aforesaid? *Answ.* 306 *l*. 4 *s*. 9 *d*. 2 *qrs*. $\frac{2}{4}$ *the Bill; and the Drawer loses* 76 *l*. 11 *s*. 2 *d*. 1 *qr*. $\frac{1}{5}$.

25 : 1 : : 1276 × 6 : 306   4   9   2 $\frac{2}{5}$, *the Value of the Bill.*

25 : 5 : : 7656 :   76   11   2   1 $\frac{1}{3}$ *Loss.*

                                     Having

Having given feveral Bills of Exchange to be reduced into Sterling or Foreign Mony; it may not be amifs to give the Form how a Bill-Book fhould be kept, that a Merchant may know at Sight what bills he has to pay, and what to receive, and when to pay and receive them.

1. Bills Payable, *i. e.* fuch as you have Accepted.

The Drawer's Name and Place of Refidence.	Date of the Bill.	The Time of Payment.	Payable to whom or Order.	The Sum drawn for	Price of Exchange.	For or by whom accepted, and Place of Abode	The Sum Sterling.	When due.	When Paid, or refus'd, Acceptance.
Will. Sberfton, of *Venice.*	17 *Aug.*	3 Months.	*Abraham Jennings,*	Ducats B° 4000	Sterling 54 d. ¼	*William Denny,* Rood-lane.	l. s. d. 904 3 4	15 *Nov.*	Paid.

2. Bills Receivable, *i. e.* fuch as you have in your Poffeffion.

The Drawer's Name and Place of Refidence.	Date of the Bill.	The Time of Payment.	Payable to whom or Order.	The Sum drawn for.	Price of Exchange.	For or by whom accepted, and Place of Abode	The Sum Sterling.	When due.	Receiv'd, or return'd protefted for Non-Acceptance, or Non-Payment	Protefted for Non-Acceptance.
Mich. Taffioni, *Florence.*	19 *Oct.*	3 Months.	*James Edwards*	Ecues. 1875	Sterling 63 d.		l. s. d. 492 5 10			17 *Jan.*

CASE

CASE 12.

Of the Comparison of WEIGHTS *and* MEASURES.

EXAMPLES.

1. If 112 *lb.* at *London* make 99 *lb.* at *Lisbon*; how many *lb.* at *London* are equal to 1049 *lb.* at *Lisbon? Answ.* 1186 *lb.* $\frac{74}{99}$.

2. If 112 *lb.* at *London* make 98 *lb.* at *Roan*; how many *lb.* at *Roan* are equal to 1000 *lb.* at *London? Answ.* 875 *lb.*

3. If 100 Elis *English* make 108 Braces at *Venice*; how many Ells *English* are equal to 1000 Braces at *Venice? Answ.* 925 *Ells* $\frac{100}{108}$.

4. If 100 Ells at *London* make 145 Ells at *Vienna*; how many Ells at *Vienna* are equal to 10 Ells at *London? Answ.* 14 *Ells* $\frac{1}{2}$.

Note, *Hence appears the Reason of those Rules, laid down in* Conjoin'd *Proportion, for placing the last Number in the Question either on the* right Hand, *or the* left, *as the Nature of the Question requires.*

lb.Lis.lb.Lon.   lb.Lis.

Ex. 1.   99 : 112 : : 1049
            lb.   *lb.*
          112 == 99
          1049

lb.Lon. lb.R. lb.Lon.

Ex. 2.   112 : 98 : : 1000
            lb.   *lb.*
          112 == 98
          1000

Of the DOUBLE RULE *of* THREE.

Q. BY *what is the* Double Rule *of* Three *known?*
     A. By five Terms which are always given in the Question to find a Sixth.

Q. *In what Proportion is the* Sixth Term *to be found?*
     A. If the Proportion is *Direct*, the *Sixth Term* must bear such Proportion to the *Fourth* and *Fifth*, as the *Third* bears to the *First* and *Second*: But if the Proportion is *Inverse*, then the *Sixth Term* must bear such Proportion to the *Fourth* and *Fifth*, as the *First* bears to the *Second* and *Third*, or as the *Second* bears to the *First* and *Third*.

Note, *It is to be observed here, as in the* Single Rule *of* Three, *that* Direct *Proportion is when* more requires more, *or* less requires less; *and* Inverse *Proportion is when* more requires less, *or* less requires more.

Q. What do you observe concerning the Five *given* Terms ?

A. That the *three first Terms* are a Suppofition ; the *two laft* are a Demand.

Q. How must the Numbers given in the Queftions *be stated ?*

A. By two *Single Rules* of *Three* : Or otherwise, thus ;

1. Let the Principal Caufe of *Lofs* or *Gain, Interest* or *Decreafe, Action* or *Paffion,* be put in the *first Place.*

2. Let that which betokeneth *Time, Distance of Place,* and the like, be put in the *second Place* ; and the remaining one in the *third Place.*

3. Place the other *two Terms* under their like in the Suppofition.

4. If the *Blank* falls under the *third Term,* multiply the *first* and *fecond Terms* for a *Divifor,* and the other *Three* for a *Dividend.*

5. If the *Blank* falls under the *fi-ft* or *fecond Term,* multiply the *third* and *fourth Te-ms* for a *Divifor,* and the other *Three* for a *Dividend* ; and the *Quotient* will be the Anfwer.

Q. How are the following Queftions proved ?

A. Let them be varied ; or elfe work the fame Queftions by two *Single Rules of Three.*

EXAMPLES.

1. If 7 Men can reap 84 Acres of Wheat in 12 Days ; how many Men can reap 100 Acres in 5 Days ? *Anfw.* 20 *Men.*

2. If 7 *Qrs.* of Malt are fufficient for a Family of 7 Perfons for 4 Months ; how many *Qrs.* are enough for 46 Perfons 10 Months ? *Anfw.* 115 *Q.s.*

3. If 8 Reapers have 3 *l.* 4 *s.* for 4 Days Work ; how much will 48 Men have for 16 Days Work ? *Anfw.* 76 *l.* 16 *s.*

4. If 10 Bufhels of Oats be enough for 18 Horfes 20 Days ; how many Bufhels will ferve 60 Horfes 36 Days ? *Anfw.* 60 *Bufh.*

5. If a Footman travels 240 Miles in 12 Days, when the Days are 12 Hours long ; how many Days may he travel 720 Miles in, of 16 Hours long ? *Anfw.* 27 Days.

6. If 56 *lb.* of Bread will be fufficient for 7 Men 14 Days ; how much Bread will ferve 21 Men 3 Days ? *Anfw.* 36 *ib.*

7. If 700 *l.* in half a Year raife 14 *lb.* Intereft ; how much will 400 *l.* raife in 5 Years ? *Anfw.* 80 *l.*

8. If 30 *s.* be the Hire of 8 Men for three Days ; how many Days muft 20 Men work for 15 *l.* ? *Anfw.* 12 *Days.*

9. If 4 Reapers have 24 *s.* for 3 Days Work ; how many Men will earn 4 *l.* 16 *s.* in 16 Days ? *Anfw.* 3 *Men.*

10. An

10. An Usurer put out 86*l.* to receive Interest for the same; and when it had continued 8 Months, he received for Principal and Interest 88 *l.* 17 *s.* 4 *d.* I demand at what Rate *per Cent.* per *Annum* he received Interest? *Answ.* 5 *l.* per *Cent.*

11. What is the Interest of 200 *l.* for 3 Years and ¼, at 5 per Cent per Annum? *Answ.* 37 *l.* 10 *s.*

12. What is the Interest of 400 *l.* for a Week, at 5 *per Cent.* per *Annum.? Answ.* 7 *s.* 8 *d.* 1 *qr.* $\frac{12}{32}$.

13. What is the Interest of 120 *l.* for 126 Days, at 4 *per Cent per Annum? Answ.* 1 *l.* 13 *s.* 1 *d.* 2 *qrs.* $\frac{258}{365}$.

Note, *The* Rule *for working Questions in* Simple Interest *for* Days, p. 67, *is taken form this* Rule, *as appears from this last Example.*

Of CONJOIN'D PROPORTION.

Q. *What is* Conjoin'd Proportion?

A. *Conjoin'd Proportion* is when the *Coins, Weights,* or *Measures* of several Countries are compared in the same Question; or it is a linking together of many *Proportions.*

CASE I.

Q. *How are Questions answered in this* Case?

A. When it is required to know how many of the *first* sort of *Coin, Weight* or *Measure,* mentioned in the *Question,* are equal to a given Number of the last; then

1. Place the Numbers alternately, beginning at the *left* Hand, and let the last Number stand on the left Hand.

2. Multiply the first Rank continually for a Dividend, and the second for a Divisor.

Note, *See the* Note *in Comparison of Weights and Measures, p.* 91, *for the Reason of this* Rule.

Q. *How is* Conjoin'd Proportion *proved?*

A. Make as many *Single Rules* of *Three* as the Nature of the Question requires.

EXAMPLES.

1. If 100 *lb. English* make 95 *lb. Flemish;* and 19 *lb. Flemish* 25 *lb.* at *Bolonia;* how many *lb. English* are equal to 50 *lb.* at *Bolonia? Answ.* 40 *lb.* English.

2. If 25 *lb.* at *London* be 22 *lb.* at *Nurenburgh;* 88 *lb.* at *Nurenburgh* 92 *lb.* at *Hamburgh;* 46 *lb.* at *Hamburgh* 49 *lb.* at *Lyons;* how many *lb.* at *London* are equal to 98 *lb.* at *Lyons? Answ.* 100 *lb.*

3. If

3. If 6 Braces at *Leghorn*, make 3 Ells *English*; 5 Ells *English* 9 Braces at *Venice*; how many Braces at *Leghorn* will make 45 Braces at *Venice? Answ.* 50 *Braces at* Leghorn.

4. If 3 Ells *English* make 6 Braces at *Leghorn*; and 150 Braces at *Leghorn* 135 Braces at *Venice*; how many Ells *English* are equal to 27 Braces at *Venice? Answ.* 15 Ells English.

CASE 2.

Q. *How are Questions answered in this* Case?

A. When it is required to know how many of the *last* sort of *Coin, Weight* or *Measure*, mentioned in the *Question* are equal to a given Number of the *first*; then

1. Place the Numbers alternately, as in *Case* 1, but let the last Number stand on the *right Hand.*

2. Multiply the *second Rank* for a Dividend, and the *first* for a Divisor.

EXAMPLES.

1. If 10 *lb.* at *London* make 9 *lb.* at *Amsterdam*; 90 *lb.* at *Amsterdam* 112 *l.* at *Thoulouse*: how many *lb.* at *Thoulouse* are equal to 50 *lb.* at *London? Answ.* 56 *lb. at* Thoulouse.

2. If 20 Braces at *Leghorn* be equal to 10 Vares at *Lisbon*; 40 Vares at *Lisbon* to 80 Braces at *Lucca*; how many Braces at *Lucca* are equal to 100 Braces at *Leghorn? Answ.* 100 *Braces at* Lucca.

Of ALLIGATION.

Q. HOW many Kinds of Alligation *are there?*
A. Two: *Alligation Medial*, and *Alligation Alternate.*

Of ALLIGATION MEDIAL.

Q. *What is* Alligation Medial?

A. *Alligation Medial* is when the Quantities and Prices of several Things are given to find the mean Price of the Mixture compounded of those Things.

Q. *What is the* Rule?

A.   As the *whole Composition,*
        Is to its *Total Value*:
        So is any *Part* of the *Composition,*
        To its *mean Price.*

Q. *How*

Q. *How is* Alligation Medial *proved?*

A. Find the Value of the whole Mixture at the *mean Rate*; and if it agrees with the Total Value of the several Quantities, at their respective Rates, the Work is right.

EXAMPLES.

1. A Farmer mingled 19 Bushels of Wheat at 6 *s. per* Bushel, and 40 Bushels of Rye, at 4 *s. per* Bushel, and 12 Bushels of Barly, at 3 *s. per* Bushel together; I demand what a Bushel of this Mixture is worth? *Answ.* 4 *s.* 4 *d.* 1 *qr.* $\frac{41}{71}$.

2. A Farmer mingled 20 Bushels of Oats, at 2 *s. per* Bushel, and 30 Bushels of Beans, at 2 *s. per* Bushel, and 20 Bushels of Peas, at 3 *s. per* Bushel together; I demand the Worth of a Bushel of this Mixture? *Answ.* 2 *s.* 3 *d.* 1 *qr.* $\frac{3}{7}$.

3. A Vintner mingled 5 Gallons of Canary, at 8 *s. per* Gallon, and 6 Gallons of Malaga, at 7 *s. per* Gallon, and 4 Gallons of white Wine, at 6 *s. per* Gallon together; I demand what a Gallon of this Mixture is worth? *Answ.* 7 *s.* 0 *d.* 3 *qrs* $\frac{1}{5}$.

4. A Grocer mingled 2 C. of Sugar, at 56 *s. per* C. and 1 C. at 43 *s. per* C. and 2 C. at 50 *s. per* C. together; I demand the Price of 3 C. of this Mixture; *Answ* 7 *l.* 13 *s.*

5. An Alehouse-keeper mixed 3 forts of Ale together, *viz.* 12 Gallons, at 6 *d. per* Gallon, 16 Gallons, at 7 *d. per* Gallon, and 21 Gallons, at 9 *d. per* Gallon; I demand what 1 Gallon of this Mixture is worth? *Answ.* 7 *d.* 2 *qrs.* $\frac{22}{49}$.

6. A Refiner having 5 *lb.* of Silver Bullion, of 8 *oz.* fine, 10 *lb* of 7 *oz.* fine, and 15 *lb.* of 6 *oz.* fine, would melt all together; I demand what Fineness 1 *lb.* of this Mass shall be? *Answ.* 6 *oz.* 13 *dwts.* 8 *gr. fine.*

7. A Mint-Master hath 3 *lb.* Weight of Gold, of 22 Carrats fine, and 3 *lb.* of 20 Carrats fine; I demand what Fineness an *oz.* of this Mixture will bear? *Answ.* 21 *Carrats fine.*

8. An Hostler mixing Provender for his Horses, would put in a Quantity of Beans, at 5 *s. per* Bushel, with the like Quantity of Oats, at 3 *s.* 6 *d. per* Bushel; I demand the Price of a Bushel of this Mixture? *Answ.* 4 *s.* 3 *d.*

9. A Malster hath several forts of Malt, *viz.* one fort at 4 *s.* 6 *d.* another at 4 *s.* and a third at 3 *s.* 6 *d. per* Bushel, and he would mix an equal Quantity of each together; I demand the Price of a Bushel of this Mixture? *Answ.* 4 *s.*

10. A

10. A Brewer had feveral forts of Ale, *viz.* one fort at 20 s. *per* Barrel ; another at 25 s. a third at 30 s. and a fourth at 35 s. *per* Barrel ; and he would mix an equal Quantity of each together ; I demand the Price of a Barrel, and alfo of a Gallon of this Mixture ? *Anfw.* 27 s. 6 d. *per Barrel,* and 10 d. 1 qr. $\frac{8}{21}$ *per Gallon.*

Of ALLIGATION ALTERNATE.

Q. *What is* Alligation Alternate ?

A. *Alligation Alternate* is, when the Rates of feveral Things are given to find fuch Quantities of them, as are neceffary to make a *Mixture,* which may bear a certain Rate propounded.

Q. *How are the Rates or Prices of the given Things to be ordered ?*

A. 1. They muft be placed one over the other, and the propounded *Price* of the *Compofition* againft them ; thus,

Mean Rate 7 $\left\{\begin{array}{l} 4 \ Prices \\ 5 \ of \ the \\ 6 \ Sim- \\ 8 \ ples. \end{array}\right.$

2. Link the feveral *Rates* together, in fuch fort, that one *greater* than the *mean Rate* may be coupled to another which is *lefs.*

3. Take the *Differences* between the *mean Rate*, and the feveral Prices, and place them each againft his Yoke-Fellow : And for the reft, obferve the following *Cafes.*

CASE I.

Q. *What do you obferve in this firft* Cafe ?

A. When the *Prices* of the feveral *Things* together with the *mean Rate* of the *Mixture* are given, without any *Quantity,* to find how much of each *Ingredient* is required to compofe the *Mixture* ; take the *Differences* between each *Price,* and the *mean Rate,* and fet them alternately, and they will be the Quantities required.

Q. *How are the Operations in* this *and the following* Cafes *proved ?*

A. They are all proved by *Alligation Medial.*

EXAMPLES.

1. How much Rye at 4 s. *per* Bufhel, Barley at 3 s. *per* Bufhel, and Oats at 2 s. *per* Bufhel, will make a Mixture worth 2 s. 6 d. *per* Bufhel ? *Anfw.* 6 Bufhels of Rye, 6 Bufhels of Barly, and 24 Bufhels of Oats.

2. How

2. How many Raisins of the Sum, at 7 *d. per lb.* and Malaga Raisins at 4 *d per lb.* may be mixed together for 6 *d per lb.*? *Answ.* 2 *lb.* of *Raisins of the Sun, and* 1 *lb. of Malaga-Raisins.*

Note, *Questions in this Rule do frequently admit of an infinite Variety of Answers, and all in whole Numbers; as in this last Example; where tho' 2 and 1 do answer the* Question, *yet any other two Numbers will as truly do the like, that are in the same Proportion.*

$$\text{For } 2 : 1 :: \begin{cases} 4 &:& 2 \\ 6 &:& 3 \\ 8 &:& 4 \\ 16 &:& 8 \\ 40 &:& 20, \text{ \&c. } \textit{without End.} \end{cases}$$

3. A Grocer would mix three sorts of Sugar together, *viz.* one sort at 10 *d. per lb.* another at 7 *d.* and another at 6 *d.* how much of each sort must he take, that the whole Mixture may be sold for 8 *d. per lb.*?

lb.   *d.*   *lb.*   *d.*   *lb.*   *d.*
Answ. 3 *at* 10; 2 *at* 7, *and* 2 *at* 6 *per lb.*

4. A Malster hath several sorts of Malt, *viz.* one sort at 4 *s. per* Bushel, another at 3 *s.* 6 *d.* a third at 3 *s.* and a fourth at 2 *s. per* Bushel; and he is desirous to mix so much of each sort together, that the Whole may be sold at 2 *s.* 6 *d. per* Bushel; I demand how much he must take of each sort?

Bush. *s.*   *B.*   *s.* *d.* *B.*   *s.*   *B.*   *s.*
Answ. 6 *at* 4; 6 *at* 3 6; 6 *at* 3, *and* 36 *at* 2 *per Bush.*

5. A Druggist hath several sorts of Tea, *viz.* one sort at 12 *s. per lb.* another at 11 *s.* a third at 9 *s.* and a fourth at 8 *s. per lb.* I demand how much of each sort he must mix together, that the whole Quantity may be afforded at 10 *s. per lb*?

	lb.	*s.p.lb.*		*lb.*	*s.p.lb.*		*lb.*	*s. p. lb.*
1 *Answ.*	2 *at*	12	2 *Answ.*	3 *at*	12	3 *Answ.*	1 *at*	12
	1 *at*	11		2 *at*	11		2 *at*	11
	1 *at*	9		2 *at*	9		2 *at*	9
	2 *at*	8		3 *at*	8		1 *at*	8

	lb.	*s.p.d.*		*lb.*	*s.p.lb.*		*lb.*	*s. p. lb.*
4 *Answ.*	1 *at*	12	5 *Answ.*	3 *at*	12	6 *Answ.*	2 *at*	12
	3 *at*	11		1 *at*	11		3 *at*	11
	3 *at*	9		3 *at*	9		1 *at*	9
	1 *at*	8		2 *at*	8		3 *at*	8

7 *Answ.* 3 *lb. of each Sort.*

Note, *These seven Answers arise from as many different Ways of linking the Rates of the Simples together.*

F

6. How

6. How much Alloy must I mix with Bullion of 16 oz. fine to abase the same to 8 oz. fine ? *Answ. To every 8 oz. of Bullion of* 10 oz. *fine, put* 2 oz. *of Alloy, and that will abase it to* 8 oz. *fine.*

C A S E 2.

Of Alternation Partial.

Q. *What do you observe in this second* Case ?

A. When the *Rates* of all the *Things,* the *Quantity* of but one of them, and the *mean Rate* of the whole *Mixture* are given to find the several *Quantities* of the rest, in Proportion to the *Quantity* given ; take the *Differences* between each *Price,* and the *mean Rate,* and place them alternately. as in *Case* 1.   Then say, As the *Difference* of the same *Name* with the *Quantity* given, Is to the rest of the *Differences* severally : So is the Quantity given, To the several *Quantities* required.

E X A M P L E S.

1. A Man being determined to mix 10 Bushels of Wheat at 4 s. *per* Bushel, with Rye at 3 s. with Barly at 2 s. and with Oats at 1 s. *per* Bushel ; I demand how much Rye, Barly, and Oats, must be mixed with the 10 Bushels of Wheat, that the Whole may be sold at 28 d. *per* Bushel ?

	B.	p.			B.	
1 *Answ.*	2	2 of Rye		2 *Answ.*	40 of Rye	
	5	0 of Barly			50 of Barly	
	12	2 of Oats			20 of Oats	
	B.				B.	
3 *Answ.*	8 of Rye			4 *Answ.*	10 of Rye	
	10 of Barly				14 of Barly	
	14 of Oats				14 of Oats	
	B.	p.			B.	
5 *Answ.*	12	2 of Rye		6 *Answ.*	2 of Rye	
	5	0 of Barly			14 of Barly	
	17	2 of Oats			10 of Oats	

	B.
7 *Answ.*	50 of Rye
	70 of Barly
	20 of Oats

2. A Man being determined to mix 12 Bushels of Oats, at 18 d. *per* Bushel, with Barly at 2 s. 6 d. with Rye at 3 s. and with Wheat at 4 s. *per* Bushel ; I demand how much Barly, Rye, and Wheat, must be mixed with the 12 Bushels of Oats,

that

that it may bear the Price of 22 *d. per* Buſhel? *Anſw.* 1 Buſhel *of each ſort.*

3. A Man being determined to mix 12 Buſhels of Oats, at 18 *d. per* Buſhel, with Barly at 2 *s.* 6 *d.* with Rye at 3 *s.* and with Wheat at 4 *s. per* Buſhel; I demand how much Barly, Rye, and Wheat, muſt be mixed with the 12 Buſhels of Oats, that the Whole may bear the Price of 2 *s.* 9 *d. per* Buſhel?

1 *Anſw.* $\begin{cases} B \\ 60 \text{ of } Barly \\ 60 \text{ of } Rye \\ 12 \text{ of } Wheat \end{cases}$ 2 *Anſw.* $\begin{cases} B. \quad p. \\ 2 \quad 1 \tfrac{2}{13} \text{ of } Barly \\ 2 \quad 1 \tfrac{9}{13} \text{ of } Rye \\ 12 \quad 0 \quad of \ Wheat \end{cases}$

3 *Anſw.* $\begin{cases} B. \\ 10 \text{ of } Barly \\ 10 \text{ of } Rye \\ 12 \text{ of } Wheat \end{cases}$ 4 *Anſw.* $\begin{cases} B. \\ 72 \text{ of } Barly \\ 72 \text{ of } Rye \\ 12 \text{ of } Wheat \end{cases}$

5 *Anſw.* $\begin{cases} B. \\ 2 \text{ of } Barly \\ 12 \text{ of } Rye \\ 10 \text{ of } Wheat \end{cases}$ 6 *Anſw.* $\begin{cases} B. \quad p. \\ 14 \quad 1 \tfrac{2}{13} \text{ of } Barly \\ 2 \quad 1 \tfrac{9}{13} \text{ of } Rye \\ 14 \quad 1 \tfrac{2}{13} \text{ of } Wheat \end{cases}$

7 *Anſw.* 12 Buſhels *of each* Sort.

4. A Man being determined to mix 12 Buſhels of Oats, at 18 *d. per* Buſhel, with Barly at 2 *s.* 6 *d.* with Rye at 3 *s.* and with Wheat at 4 *s. per* Buſhel; I demand how much Barly, Rye, and Wheat, muſt be mixed with the 12 Buſhel of Oats, that the whole Quantity may bear the Price of 3 *s.* 6 *d. per* Buſhel?

Anſw $\begin{cases} B \\ 12 \text{ of } Barly \\ 12 \text{ of } Rye \\ 84 \text{ of } Wheat \end{cases}$

5. A Man intends to mix 28 Buſhels of Oats, at 18 *d. per* Buſhel, with Barly at 2 *s.* 6 *d.* with Rye at 3 *s.* and with Wheat at 4 *s.* I would know how much Barly, Rye, and Wheat, ought to be added to the 28 Buſhels of Oats, that the whole Quantity may be afforded at 2 *s. per* Buſhel? *Anſw.* 4 Buſhels *of each* Sort.

6. A Farmer would mix 27 Buſhels of Peaſe, at 18 *d. per* Buſhel, with Oats at 28 *d.* and with Beans at 30 *d. per* Buſhel, that the whole Quantity may bear the Price of 20 *d. per* Buſhel, I demand how much Oats and Beans muſt be mixed with the 27 Buſhels of Peaſe? *Anſw.* 3 Buſhels *of each* Sort.

F 2 C A S E

C A S E 3.

Of Alternation Total.

Q. What do you obſerve in this third Caſe?

A. When the *Rates* of the ſeveral *Things,* the *Quantity* to be compounded, and the *mean Rate* of the whole *Mixture* are given, to find how much of each ſort wiil make up the *Quantity;* place the *Differences* between the ſeveral *Prices,* and the *mean Rate,* alternately, as in *Caſe* 1. Then ſay,

> As the *Sum* of the *Differences,*
> Is to the *whole Compoſition:*
> So is the *Difference* of each *Rate,*
> To the *Quantity* of the ſame *Rate.*

E X A M P L E S.

1. A Grocer hath 4 ſorts of Sugar, *viz.* at 8 *d. per lb.* at 6 *d. per lb.* at 4 *d. per lb.* and at 2 *d. per lb.* and he would have a Compoſition of an *C. wt.* worth 5 *d. per lb.* I demand how much of each Sort he muſt take?

1 *Anſw.*
lb.	*d p. lb.*
42	at 8
14	at 6
14	at 4
42	at 2
112	

2 *Anſw.*
lb.	*d. p. lb.*
14	at 8
42	at 6
42	at 4
14	at 2
112	

3 *Anſw.*
lb.	oz.	dr.	*d. p. lb.*
28	0	0	at 8
37	5	$5\frac{4}{7}$	at 6
9	5	$5\frac{4}{7}$	at 4
37	5	$5\frac{4}{7}$	at 2
112	0	0	

4 *Anſw.*
lb.	oz.	dr.	*d.p.lb.*
37	5	$5\frac{4}{7}$	at 8
9	5	$5\frac{4}{7}$	at 6
37	5	$5\frac{4}{7}$	at 4
28	0	0	at 2
112	0	0	

5 *Anſw.*
lb.	oz.	dr.	*d.p.lb.*
11	3	$3\frac{2}{10}$	at 8
44	12	$12\frac{8}{10}$	at 6
44	12	$12\frac{8}{10}$	at 4
11	3	$3\frac{2}{10}$	at 2
112	0	0	

6 *Anſw.*
lb.	*d. p. lb.*
32	at 8
24	at 6
24	at 4
32	at 2
112	

7 *Anſw.* 28 *lb.* of each ſort.

2. A

2. A Vintner hath 4 forts of Wine, *viz.* Canary at 10 s. *per* Gallon, Malaga at 8 s. Rhenifh at 6 s. and Oporto at 4 s. and he is minded to make a Compofition of 60 Gallons, worth 9 s. *per* Gallon ; I demand how much of each fort he muft have ? *Anfw.* 45 Gals. *of Canary, and* 5 Gals. *of each other fort.*

3. A Brewer hath 3 forts of Ale, *viz.* at 10 d. at 8 d. and at 6 d. *per* Gallon ; and he would have a Compofition of 30 Gallons, worth 7 d. *per* Gallon ; I demand how much of each fort he muft have ?

$$\left\{ \begin{array}{l} \text{Gals.} \quad d. \text{ per Gallon.} \\ \quad 5 \ at \ 10 \\ \quad 5 \ at \ 8 \\ 20 \ at \ 6 \\ \overline{} \\ 30 \\ \overline{} \end{array} \right.$$

Anfw.

4. A Goldfmith hath feveral Sorts of Gold, *viz.* fome of 24 Carrats fine, fome of 22 Carrats, and fome of 18 Carrats fine ; and he would have compounded of thefe forts the Quantity of 60 *oz.* of 20 Carrats fine ; I demand how much of each fort he muft take ?

Anfw.
$$\left\{ \begin{array}{l} \text{Oz.} \\ 12 \ at \ 24 \ \textit{Carrats fine.} \\ 12 \ at \ 22 \ \textit{Carrats fine.} \\ 36 \ at \ 18 \ \textit{Carrats fine.} \\ \overline{} \\ 60 \\ \overline{} \end{array} \right.$$

5. A Goldfmith hath Gold of three forts, *viz.* of 22 Carrats, of 21 Carrats, and of 20 Carrats fine, and he would mix with thefe fo much Alloy, as that the Quantity of 21 *oz.* may bear 18 Carrats fine ; I demand how much of each fort he muft take and how much Alloy ? *Anfw.* 6 *oz. of each fort of* Gold, *and* 3 *oz. of* Alloy.

6. A Druggift had three forts of Drugs, one was worth 4 s. *per* lb. another 5 s. and another 8 s. and out of thefe he made two Parcels, one was 21 lb. at 6 s. *per* lb. and the other 35 lb. at 7 s. *per* lb. how much of every fort did he take for each Parcel ?

Anfw.
$$\left\{ \begin{array}{ll} \text{lb.} \quad s. \text{ per lb.} & \text{lb.} \quad s. \text{ per lb.} \\ 6 \ at \ 4 & 5 \ at \ 4 \\ 6 \ at \ 5 & 5 \ at \ 5 \\ 9 \ at \ 8 & 25 \ at \ 8 \\ \overline{} & \overline{} \\ 21 \ at \ 6 s. \text{ per } lb. & 35 \ at \ 7 s. \text{ per } lb. \\ \overline{} & \overline{} \end{array} \right.$$

Of

Of POSITION.

Q. **W**HAT *is* Pofition, *or* Negative Arithmetic ?
    A. It difcovers the Truth by fuppofed Numbers.
Q. *How many Kinds of* Pofition *are there?*
A. Two : *Single* and *Double.*

Of SINGLE POSITION.

Q. *What is* Single Pofition ?
A. It difcovers the Truth by only *one* fuppofed Number.
Q. *How is that fuppofed* Number *ufed?*
A. By working with it, as if it was the true Number, in the fame Proportion as the Queftion directs ; and if the Refult be either too much, or too little, the true Number may be found out by the following Rule, *viz.*

> As the *Refult* of the *Pofition,*
> Is to the *Pofition :*
> So is the given *Number,*
> To the *Number* required.

Q. *How do you prove* Pofition ?
A. Pofition, both *Single* and *Double,* is proved by adding the feveral *Sums* required, or the feveral *Parts* of the *Sum* required together ; and if that *Sum* agrees with the given *Sum,* it is right.

EXAMPLES.

1. Two Men, *A* and *B,* having found a Bag of Mony, difputed who fhould have it ; *A* faid the half, third and fourth of the Mony made 130 *l.* and if *B* could tell how much was in it, he fhould have it all, otherwife he fhould have nothing ; I demand how much was in the Bag ? *Anfw.* 120 *l.*

2. *A, B,* and *C,* determining to buy together a certain Quantity of Timber, worth 36 *l.* agree that *B* fhall pay ⅓ more than *A,* and *C* ¼ more than *B* ; I demand how much each Man muft pay ? *Anfw. A* 9 *l. B* 12 *l. C.* 15 *l.*

3. A Perfon having about him a certain Number of Crowns, faid, if the half, third and fourth of them were added together, they would make 65 Crowns ; I demand how many he had ? *Anfw.* 60 *Crowns.*

4. *A* lent *B* a Sum of Mony, to be paid at 4 Payments ; when 3 of them were made, and *A* came to demand the fourth, *B* would give him no more, except he would tell him how much was paid already : *A* faid the firft Payment was a fourth ; the fecond, a fifth ; and the third, a fixth of the Sum firft lent ; and all together made 74 *l.* I demand the Sum lent ? *Anfw.* 120 *l.*

5. One

5. One Man carrying a Bag of Mony in his Hand, another asked him, how much was in it : He answered, he could not tell ; but the third, fourth, and fifth of it made 94 *l*. How much was in the Bag ? *Answ.* 120 *l*.

6. I have delivered to a Banker a certain Sum of Mony, to receive of him after the Rate of 6 *l. per Cent. per Annum* ; and at the End of ten Years, he paid me 500 *l*. for Principal and Interest together ; I demand the Sum delivered to him at first *Answ.* 312 *l*. 10 *s*.

Of DOUBLE POSITION.

Q. What is Double Position ?

A. It is that which discovers the true Number sought, by making use of *two* supposed Numbers.

Q. How are those supposed Numbers used ?

A. 1. By working with them as if they were the true Numbers, in the same Proportion as the Question directs.

2. The *Results* or *Errors* must be placed against their *Positions*, or supposed Numbers ; thus,

Pos.	Er.
40	23
36	19

3. Multiply them *Cross-wise.*

4. If the *Errors* are *alike* ; *i. e.* both greater, or both less than the given Number, take their *Difference* for a *Divisor*, and the *Difference* of the *Products* for a *Dividend.*

5. If the *Errors* are *unlike*, take their *Sum* for a *Divisor*, and the *Sum* of the *Products* for a *Dividend* ; the *Quotient* thence arising will be the *Answer.*

EXAMPLES.

1. *A, B,* and *C,* would divide 100 *l*. between them, so, as that *B* may have 3 *l* more than *A,* and *C* 4 *l*. more than *B* ; I demand how much each Man must have ? *Answ. A* 30 *l*. *B* 33 *l*. *C* 37 *l*.

2. A Man lying at the Point of Death, said, He had in a certain Coffer 100 *l*. which he bequeathed to 3 of his Friends after this Manner ; The first must have a certain Portion ; the second must have twice as much as the first wanting 8 *l*. and the third must have three times as much as the first, wanting 15 *l*. I demand how much must each Man have ? *Answ. The First* 20 *l*. 10 *s*. *Second* 33 *l*. *Third* 46 *l*. 10 *s*.

3. *A, B,* and *C,* built an House, which cost 100 *l*. of which *A* paid a certain Sum ; *B* paid 10 *l*. more than *A* ; and *C* paid as much as *A* and *B* ; I demand each Man's Share in that Charge ? *Answ. A* paid 20 *l*. *B* 30 *l*. *C* 50 *l*.

4. Three

4. Three Perfons difcourfed together concerning their Ages ; fays *A*, I am 20 Years of Age ; fays *B*, I am as old as *A*, and half *C* ; and fays *C*, I am as old as you both : I demand the Age of each Perfon ? *Anfw. A was* 20, *B* 60, *C* 80 *Years of Age.*

5. A Man lying at the Point of Death, left to his 3 Sons all his Eftate in Mony, *viz* to *F* half wanting 50*l.* to *G* one third ; and to *H* the reft, which was 10*l.* lefs than the Share of *G* ; I demand the Sum left, and each Man's Part ? *Anfw The Sum left was* 360 *l.* *whereof F had* 130 *l.* *G* 120 *l.* *H* 110 *l.*

6. A certain Man having drove his Swine to the Market, *viz.* Hogs, Sows, and Pigs, received for them all 50 *l* being paid for every Hog 18*s.* for every Sow 16*s.* for every Pig 2*s.* there were as many Hogs as Sows, and for every Sow there were three Pigs ; I demand how many there were of each fort ? *Anfw.* 25 *Hogs,* 25 *Sows,* 75 *Pigs.*

7. A furly old Fellow being demanded the Ages of his four Children, anfwer'd, You may go and look : But if you muft needs know ; my firft Son was born juft one Year after I was married to his Mother, who, after his Birth, lived 5 Years, and then died in Child-bed with my fecond Son : 4 Years after that I married again, and within 2 Years had my third and fourth Sons at a Birth ; the Sum of whofe two Ages is now equal to that of the eldeft : I demand their feveral Ages ? *Anfw. The firft Son was 22 Years old, the fecond 17, the third 11, and the fourth 11 Years old.*

Of COMPARATIVE ARITHMETIC.

Q. WHAT is Comparative Arithmetic ?

 A. It is fuch as anfwers Queftions by Numbers, having *Relation* one to another.

Q. *Wherein does this Relation confift ?*

A. It confifts either in *Quantity* or *Quality.*

Q. *What is Relation of Numbers in* Quantity ?

A. It is the *Refpect* that one Number has to another.

Q. *How many are the Numbers propounded ?*

A. They are always two, the *Antecedent* and the *Confequent.*

Q. *In what does Relation of Numbers in* Quantity *confift ?*

A. It confifts in the *Difference,* or elfe in the *Rate* or *Reafon* that is found between the Terms propounded.

Note, *The* Difference *of any two Numbers is the* Remainder ; *but the* Rate *or* Reafon *is the* Quotient *of the* Antecedent *divided by the* Confequent.

Q. *What is Relation of Numbers in* Quality *or* Progression ?

A. *Progression* or *Proportion* is the *Respect* that the Reason of Numbers have one to another.

Q. *How many must the Terms be ?*

A. *Three* or *more,* but never *less :* Because less than *three* will not admit of a Comparison of *Reasons* or *Differences.*

Of PROGRESSION.

Q. *How many kinds of* Progression *are there ?*

A. Two : *Arithmetical* and *Geometrical.*

Of ARITHMETICAL PROGRESSION.

Q. *What is* Arithmetical Progression ?

A. *ArithmeticalProgression* is when several Numbers have equal Differences ; as 1, 2, 3, 4, differ by 1 ; or 2, 4, 6, 8, differ by 2.

Note 1, *If any Number of Terms differ by* Arithmetical Progression, *the Sum of the two* Extreams *will be equal to the Sum of any two* Means *equally distant from the* Extreams. *As in* 2, 4, 6, 8 ; *where* 2 + 8 *are* = 4 + 6 = 10, *and so of any larger Number of* Terms.
2. *If the Number of* Terms *be odd, the middlemost supplies the Place of two* Terms. *As in* 1, 2, 3 ; *where* 1 + 3 *are* = 2 + 2 = 4.

CASE I.

Q. *What do you observe in this first* Case ?

A. When the two *Extreams,* and the Number of *Terms* in any *Series* of Numbers in *Arithmetical Progression* are given, and the Sum of all the Terms is required, then multiply the *Sum* of the two *Extreams* by half the Number of *Terms :* Or,

Multiply half the *Sum* of the *Extreams* by the whole Number of *Terms,* the *Product* is the Total of all the Terms.

EXAMPLES.

1. How many Strokes does the Hammer of a Clock strike in 12 Hours ? *Answ.* 78.

2. A Merchant hath sold 100 Yards of superfine Cloth, *viz.* the first Yard for 1*s.* the second for 2*s.* the third for 3*s. &c.* I demand how much he received for the said Cloth ? *Answ.* 252 *l.* 10 *s.*

3. Bought 19 Yards of Shalloon, and gave 1 *d.* for the first Yard; 3 *d.* for the second, 5 *d.* for the third, *&c.* increasing 2 *d.* every Yard; I demand what I gave for the 19 Yards ? *Answ.* 1 *l.* 10 *s.* 1 *d.*

4. A Mercer sold 20 Yards of Silk, at 3 *d.* for the first Yard, 6 *d.* for the second, 9 *d.* for the third, *&c.* increasing 3 *d.* every Yard; I demand what he sold the 20 Yards for ? *Answ.* 2 *l.* 12 *s.* 6 *d.*

5. A Butcher bought 100 Head of Cattle, *viz.* Oxen, and gave for the first Ox 1 Crown, for the second Ox 2 Crowns, for the third Ox 3 Crowns, *&c.* I demand what the Cattle cost him ? *Answ.* 1262 *l.* 10 *s.*

F 5   6. Admit

6. Admit 100 Stones were laid 2 Yards diftant from each other in a right Line, and a Bafket placed 2 Yards from the firft Stone ; I demand how many Miles a Man fhall go in gathering them fingly into the Bafket? *Anfw.* 11 *Miles,* 3 *Furlongs,* 180 *Yards.*

7. A Merchant fold 1000 Yards of Linen at 2 Pins for the firft Yard, 4 for the fecond, 6 for the third, *&c.* increafing 2 Pins, for every Yard ; I demand how much the Linen produced, when the Pins were afterwards fold at 12 for a Farthing ? Alfo whether the faid Merchant gained or loft by the Sale thereof, and how much, fuppofing the faid Linen to have been bought at 6 *d. per* Yard.

$$Anfw. \begin{cases} \text{The Linen produced } 86\textit{l. } 17\textit{s. } 10\textit{d.} \\ \text{The Merchant gained } 61 \quad 17 \quad 10 \end{cases}$$

CASE 2.

Q. *What do you obferve in this fecond* Cafe ?

A. When the two *Extreams,* and the Number of *Terms* in any *Series* of Numbers in *Arithmetical Progreffion* are given, and the *common Difference* of all the Terms in that *Series* are required, then

Divide the *Difference* between the two *Extreams,* by the Number of *Terms,* lefs *one* ; the *Quotient* will be the *common Difference.*

EXAMPLES.

1. There are 21 Men, whofe Ages are equally diftant from each other in Arithmetical Progreffion : the Youngeft is 20 Years old, and the Eldeft is 60 ; I demand the common Difference of their Ages, and the Age of each Man ? *Anfw.* *The common Difference is two Years* ; *therefore,*

Years.

60 is the *Age of the firft* Man.

60 — 2 = 58 is the *Age of the Second.*

58 — 2 = 56 is the *Age of the Third.*

56 — 2 = 54 is the *Age of the Fourth,* &c.

2. A Debt is to be difcharged at 16 feveral Payments in Arithmetical Proportion ; the firft Payment is to be 14 *l.* the laft 100 *l.* what is the whole Debt, and what muft each Payment be ? *Anfw.* *The whole Debt is* 912 *l.* *The common Difference is* 5 *l.* 14 *s.* 8 *d. therefore,*

14 *l.*	0 *s.*	0 *d.*								1 *ft* Payment.
14 *l.*	0 *s.*	0 *d.*	+	5 *l.*	14 *s.*	8 *d.*	=	19	14	8	2 *d.*
19	14	8	+	5	14	8	=	25	9	4	3 *d.*
25	9	4	+	5	14	8	=	31	4	0	4 *th,* &c.

3. A Man

3. A Man is to travel from *York* to a certain Place in 12 Days, and to go but three Miles the firft Day, increafing every Day's Journey by an equal Excefs, fo that the laft Day's Journey may be 36 Miles; what will each Day's Journey be, and how many Miles is the Place he goes to diftant from *York?* *Anfw. The common Difference is* 3; *therefore,*

Miles.
3 *is the firft Days Journey.*

3 + 3 = 6 *is the Second.*
6 + 3 = 9 *is the Third.*
9 + 3 = 12 *is the Fourth,* &c.
The whole Diftance is 234 *Miles.*

4. A running Footman, on a Wager, is to travel from *London* Northward, as follows: that is to fay, he is to go 4 Miles the firft Day; and 40 Miles the laft Day; and to go the whole Journey in 10 Days, increafing every Day's Journey by an equal Excefs; I demand the Number of Miles he travelled each Day, and the Length of the whole Journey? *Anfw. The common Difference is* 4; *therefore,*

Miles.
4 *is the firft Day's Journey.*

4 + 4 = 8 *is the Second.*
8 + 4 = 12 *is the Third,* &c.
The whole Journey is 220 *Miles.*

Of GEOMETRICAL PROGRESSION.

Q. *What is* Geometrical Progreffion?

A. When any *Rank* or *Series* of Numbers *increafes* by one *common Multiplier,* or *decreafes* by one *common Divifor,* thofe Numbers are continued in *Geometrical Progreffion*; as 3, 6, 12, 24, increafe by the *Multiplier* 2; and 24, 12, 6, 3, decreafe by the *Divifor* 2.

Note 1, *If any Number of* Terms *be continued in* Geometrical Progreffion, *the* Product *of the two* Extreams *will be equal to the* Product *of any two* Means *equally diftant from the* Extreams; *as in* 3, 6, 12, 24; *where* 3 × 24, *are* = 6 × 12 = 72; *and fo of any larger Number of* Terms.

2. *If the Number of* Terms *be odd, the Middlemoft fupplies the Place of two* Terms; *as in* 3, 6, 12; *where* 3 × 12 *are* = 6 × 6 = 36.

3. *The* common Multiplier, *and the* common Divifor, *are called* Ratios.

Q. *How*

Q. *How is the* Sum *of any* Series *in* Geometrical Progression *obtained?*

A. 1. When all the *Terms* alone are given, then from the *Product* of the *second* and *last Terms* subtract the *Square* of the *first Term:* that Remainder being divided by the *second Term* less the *first,* will give the *Sum* of all the *Terms.*

2. When the two *Extreams* and the *Ratio* are only given, then multiply the last *Term* into the *Ratio,* and from that *Product* subtract the first *Term:* that *Remainder* divide by the *Ratio* less an *Unit* or 1, the *Quotient* is the *Sum* of all the *Terms.*

Note 1, *As the* last Term *in a long Series of Numbers is very tedious to come at by continual* Multiplication: *it would be necessary for the readier finding it out, to have a* Series *of Numbers in* Arithmetical Proportion, *called* - Indices, *beginning with an* Unit, *whose common Difference is* One : *Also whatsoever Number of* Indices *you make choice of, let as many Numbers (in such* Geometrical Proportion *as are given in the Question) be placed under them.*

Thus, $\begin{cases} 1, & 2, & 3, & 4, & 5, & 6, & 7, \textit{ Indices.} \\ 2, & 4, & 8, & 16, & 32, & 64, & 128, \textit{ Numbers in Geometrical Proportion.} \end{cases}$

2. *But if the* first Term *in* Geometrical Proportion *be different from the* Ratio, *the* Indices *must begin with a* Cypher.

Thus, $\begin{cases} 0, & 1, & 2, & 3, & 4, & 5, & 6, \textit{ Indices.} \\ 1, & 2, & 4, & 8, & 16, & 32, & 64, \textit{ Numbers in Geometrical Proportion.} \end{cases}$

3. *When the* Indices *begin with a* Cypher, *the* Sum *of the* indices *made choice of, must always be one less than the Number of* Terms *given in the Question; because* 1 *in the* Indices *stands over the* second Term, *and* 2 *in the* Indices *stands over the* third Term, *&c.*

4. *Add any two of these* Indices *together, and that* Sum *will directly correspond with the* Product *of their respective* Terms.

5. *By the Help of these* Indices, *and a few of the first* Terms, *in any Series of* Geometrical Progression, *any Term, whose Distance from the first Term is assigned, tho' it were never so far, may speedily be obtained, without producing all the* Terms.

EXAMPLES.

1. A Man bought a Horse, and by Agreement was to give a Farthing for the first Nail, two for the Second, four for the Third, *&c.* there were 4 Shoes, and 8 Nails in each Shoe : I demand what the Horse was worth at that Rate? *Answ.* 4473924*l.* 5 *s.* 3 *d.* 3 *qrs.*

2. A Merchant sold 15 Yards of Sattin, the first Yard for 1 *s.* the second for 2 *s.* the third for 4 *s.* the fourth for 8 *s. &c.* I demand the Price of the 15 Yards? *Answ.* 1638 *l.* 7 *s.*

3. A Draper sold 20 Yards of superfine Cloth, the first Yard for 3 *d.* the Second for 9 *d.* the Third for 27 *d. &c.* in triple Proportion Geometrical ; I demand the Price of the Cloth? *Answ.* 21792402 *l.* 10 *s.*

4. A Gold-

4. A Goldfmith fold 1 *lb.* of Gold, at a Farthing for the firft Ounce, a Penny for the fecond, 4 *d.* for the third, *&c.* in quadruple Proportion Geometrical; I demand what he fold the Whole for; alfo how much he gained by the Sale thereof, fuppofing he gave for it 4 *l. per* Ounce?

Anfw. { He fold it for 5825 *l.* 8 *s.* 5 *d.* 1 *qr.* \
 { And gained 5777 8 5 1

5. A crafty Servant agreed with a Farmer (ignorant in Numbers) to ferve him 12 Years, and to have nothing for his Service but the Produce of a Wheat-Corn for the firft Year; and that Product to be fowed for the fecond Year; and fo on from Year to Year, until the End of the faid Time; I demand the Worth of the whole Produce, fuppofing the Increafe to be but in a tenfold Proportion, and fold out at 4 *s. per* Bufhel? *Anfw.* 452112 *l.* 4 *s. rejecting Remainders.*

> Note 1. 7680 *Wheat or Barly-Corns are fuppofed to make a Pint, and* 64 *Pints a Bufhel.*
>
> 2. *If the firft Term in any* Series, *be either* greater or lefs *than the* Ratio, (except Unity) *then* multiply any two Terms together, *and their* Product divide by the firft Term; *that* Quotient *will exactly correfpond with the* Sum *of their* Indices.

6. A Threfher worked 20 Days at a Farmer's, and received for the firft Day's Work, 4 Barly-Corns; for the fecond, 12 Barly-Corns; for the third, 36 Barly-Corns; and fo on in triple Proportion Geometrical; I demand what the 20 Days Labour came to, fuppofing the whole Quantity to be fold for 2 *s.* 6 *d. per* Bufhel? *Anfw.* 1773 *l.* 7 *s.* 6 *d. rejecting Remainders.*

7. A Merchant fold 30 Yards of fine Velvet, trimmed with Gold very curioufly, at 2 Pins for the firft Yard, 6 Pins for the fecond, 18 Pins for the third, *&c.* in triple Proportion Geometrical; I demand how much the Velvet produced, when the Pins were afterwards fold at 100 for a Farthing; alfo, whether the faid Merchant gained or loft by the Sale thereof, and how much, fuppofing the faid Velvet to have been bought at 50 *l. per* Yard?

Anfw. { *The Velvet produced* 2144699292 *l.* 13 *s.* 0 *d.* $\frac{1}{2}$. \
 { *The Merchant gained* 2144697792 13 0 $\frac{1}{2}$.

Of PERMUTATION.

Q. WHAT *is* Permutation?

A. Changing the Order of Things.

Q. *How do you find all the* Variations, *any Number of* Things *is capable of going through?*

A. Multiply all the given *Terms* one into another continually; the laft Product is the Number of *Changes* required.

EXAM-

EXAMPLES

1. I demand how many Changes may be rung upon twelve Bells; and also how long they would be in ringing but once over, supposing 24 Changes might be rung in one Minute, and the Year to contain 365 Days, 6 Hours? *Answ. The Number of Changes is* 479001600, *and the Time is* 37 *Years,* 49 *Weeks,* 2 *Days,* 18 *Hours.*

2. Seven Gentlemen that were travelling, met together by chance, at a certain Inn upon the Road, where they were so well pleased with their Host, and each others Company, that in a Frolic, they offer'd him 30 *l.* to stay at that Place so long as they, together with him, could sit every Day at Dinner in a different Order: The Host thinking that they could not sit in many different Positions, because there were but a few of them, and that himself would make no considerable Alteration, he being but one, imagined that he should make a good Bargain; and readily (for the sake of a good Dinner and better Company) enter'd into an Agreement with them, and so made himself the eighth Person: I demand how long they staid at the said Inn, and how many different Positions they sat in? *Answ. The Number of Positions were* 40320; *and the Time that they staid was* 110 *Years,* 142 *Days; allowing the Year to consist of* 365 *Days,* 6 *Hours.*

Note, *There is one Thing in Progression, and in Varying the Order of Things, which is well worth our Observation; and that is The Power of Numbers, which is surprizingly great, and beyond common belief; and is no ways conceivable by a common Practitioner, hardly by a very good Artist; it being (in Appearance) not so much against Reason as above it. The first Example in Geometrical Progression, discovers what a prodigious Sum of Mony a Horse sold after that Manner would produce, viz. no less than Four Millions four hundred seventy-three thousand nine hundred and twenty-four Pounds: whereas if the same Horse had been sold at the same Rate, and but a fourth Part of the Nails, he would have brought to his Owner no more than* 5 *s.* 3 *d.* $\frac{1}{4}$. *The second Example in Permutation, does likewise discover the Impossibility of the Innkeeper's performing his Promise; and in both, the Simplicity of two Men, who thinking they have got very good Bargains, do, instead thereof, find themselves severe Sufferers. And altho' at the first Appearance, each Question seems to produce but a meer Trifle; yet upon a mature Consideration, there would not be found a Man in the Kingdom able to purchase the one, or long-liv'd enough to stand to the Agreement with the other. Hence observe the great Possibility of a Man's being impos'd on in this way, by Sharpers, without a careful Examination into the Affair, before any Contraction is made.*
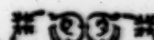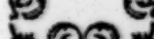
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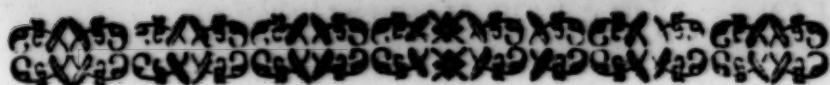
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PART II.

Of VULGAR FRACTIONS.
Of Fractions in general.

Q. *WHAT is a Fraction?*

A. It is a broken Number; and signifies the Part or Parts of a whole Number.

Q. *How many Kinds of Fractions are there?*

A. Two: *Vulgar* and *Decimal.*

Of NOTATION of VULGAR FRACTIONS.

Q. *What is a Vulgar Fraction?*

A. Any two Numbers placed thus $\frac{3}{4}$ make a *Vulgar Fraction.*

Q. *What is the upper Number of a Fraction called?*

A. It is called *Numerator*, and is the Remainder after Division.

Q. *What is the lower Number called?*

A. It is called *Denominator*; and notes any Whole divided into Parts: and is the Divisor in Division.

Q. *How many sorts of Vulgar Fractions are there?*

A. Three: *Proper, Improper.* and *Compound.*

Q. *What is a proper Fraction?*

A. When the *Numerator* is less than the *Denominator*, as $\frac{3}{8}$.

Q. *How far may a proper Fraction be express'd?*

A. Without end; as $\frac{1}{2}$ may be called $\frac{2}{4}$ or $\frac{3}{6}$ or $\frac{4}{8}$, &c. but the lowest Term $\frac{1}{2}$ is always desired.

Q. *What is an improper Fraction?*

A. When the *Numerator* is greater than the *Denominator*, as $\frac{8}{7}$.

Q. *What is a Compound Fraction?*

A. It is the Fraction of a Fraction; as $\frac{1}{2}$ of $\frac{2}{3}$, &c.

Of REDUCTION of VULGAR FRACTIONS.
CASE I.

Q. *HOW are Vulgar Fractions reduced to a common Denominator?*

A. 1. Multiply each *Numerator* into all the *Denominators* but its own, for a new *Numerator.*

2. Multiply all the *Denominators* for a common *Denominator.*

EXAM-

1. Reduce $\frac{1}{2}$ and $\frac{1}{4}$ to a common Denominator. *Facit* $\frac{24}{48}$ and $\frac{12}{48}$.

2. Reduce $\frac{7}{8}$, $\frac{9}{10}$ and $\frac{11}{12}$ to a common Denominator. *Facit* $\frac{840}{960}$, $\frac{864}{960}$ and $\frac{880}{960}$.

3. Reduce $\frac{6}{10}$, $\frac{4}{8}$, $\frac{1}{9}$ and $\frac{6}{7}$ to a common Denominator. *Facit* $\frac{3024}{5040}$, $\frac{2520}{5040}$, $\frac{560}{5040}$ and $\frac{4320}{5040}$.

4. Reduce $\frac{4}{9}$, $\frac{7}{11}$, $\frac{6}{7}$ and $\frac{1}{2}$ to a common Denominator. *Facit* $\frac{616}{1386}$, $\frac{882}{1386}$, $\frac{1188}{1386}$ and $\frac{693}{1386}$.

5. Reduce $\frac{6}{9}$, $\frac{2}{7}$, $\frac{1}{3}$ and $\frac{7}{8}$ to a common Denominator. *Facit* $\frac{1008}{1512}$, $\frac{432}{1512}$, $\frac{504}{1512}$ and $\frac{1323}{1512}$.

6. Reduce $\frac{4}{7}$, $\frac{1}{2}$, $\frac{5}{6}$ and $\frac{2}{8}$ to a common Denominator. *Facit* $\frac{384}{480}$, $\frac{240}{480}$, $\frac{400}{480}$ and $\frac{120}{480}$.

CASE 2.

Q. How do you reduce a Vulgar Fraction *to its loweft* Terms?

A. 1. Find a *common Meafure* by dividing the lower *Term* by the upper; and that *Divifor* by the *Remainder* following, till nothing remains: the laft *Divifor* is the *common Meafure*.

2. Divide both Parts of the *Fraction* by the *common Meafure*, and the *Quotients* will make the *Fraction* required.

Note 1, *If the* common Meafure *happens to be* 1, *the given* Fraction *is already in its loweft* Terms.

2. *When a* Fraction *hath* Cyphers *at the right Hand, it may be abbreviated by cutting them off; thus,* $\frac{7|0}{9|0}$.

3. *This Cafe will prove* Cafe 1.

EXAMPLES.

1. Reduce $\frac{48}{56}$ to its loweft Terms. *Facit* $\frac{6}{7}$.

2. Reduce $\frac{72}{94}$ to its loweft Terms. *Facit* $\frac{36}{47}$.

3. Reduce $\frac{84}{170}$ to its loweft Terms. *Facit* $\frac{42}{85}$.

4. Reduce $\frac{60}{125}$ to its loweft Terms. *Facit* $\frac{12}{25}$.

5. Reduce $\frac{182}{196}$ to its loweft Terms. *Facit* $\frac{13}{14}$.

6. Reduce $\frac{468}{1184}$ to its loweft Terms. *Facit* $\frac{117}{296}$.

CASE 3.

Q. What is a mixt Number?

A. It is compofed of a *whole Number* and a *Fraction*, thus $7\frac{3}{4}$.

Q. How is a mixt Number *reduced to an* improper Fraction?

A. 1. Multiply the *whole Number* into the *Denominator* of the *Fraction*.

2. To the Product, add the *Numerator* for a new *Numerator*.

3. Let its *Denominator*, be the *Denominator* given.

Note, *To exprefs a* whole Number Fraction-wife, *put* 1 *for its* Denominator.

EXAM-

EXAMPLES.

1. Reduce $12\frac{15}{17}$ to an improper Fraction. *Facit* $\frac{219}{17}$.
2. Reduce $19\frac{12}{18}$ to an improper Fraction. *Facit* $\frac{354}{18}$.
3. Reduce $16\frac{18}{100}$ to an improper Fraction. *Facit* $\frac{1618}{100}$.
4. Reduce $12\frac{19}{36}$ to an improper Fraction. *Facit* $\frac{601}{36}$.
5. Reduce $100\frac{19}{59}$ to an improper Fraction. *Facit* $\frac{5919}{59}$.
6. Reduce $79\frac{12}{19}$ to an improper Fraction. *Facit* $\frac{1513}{19}$.

CASE 4.

Q. *How is an* improper Fraction *reduced to its proper* Terms?
A. Divide the *upper Term* by the *lower.*

Note, *This* Cafe, *and* Cafe ?, *prove each other.*

EXAMPLES.

1. Reduce $\frac{219}{17}$ to its proper Terms. *Facit* $12\frac{15}{17}$.
2. Reduce $\frac{141}{17}$ to its proper Terms. *Facit* $8\frac{5}{17}$.
3. Reduce $\frac{126}{48}$ to its proper Terms. *Facit* $2\frac{30}{48}$.
4. Reduce $\frac{961}{17}$ to its proper Terms. *Facit* $56\frac{9}{17}$.
5. Reduce $\frac{13}{7}$ to its proper Terms. *Facit* $1\frac{6}{7}$.
6. Reduce $\frac{24}{7}$ to its proper Terms. *Facit* $3\frac{3}{7}$.

CASE 5.

Q. *How do you reduce a* compound Fraction *to a* single one?
A. 1. Multiply all the *Numerators* for a new *Numerator.*
2. Multiply all the *Denominators* for a new *Denominator.*

EXAMPLES.

1. Reduce $\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{1}{4}$ to a single Fraction. *Facit* $\frac{6}{24}$.
2. Reduce $\frac{7}{8}$ of $\frac{4}{6}$ of $\frac{9}{10}$ to a single Fraction. *Facit* $\frac{252}{480}$.
3. Reduce $\frac{12}{14}$ of $\frac{5}{6}$ of $\frac{1}{2}$ to a single Fraction. *Facit* $\frac{60}{108}$.
4. Reduce $\frac{5}{3}$ of $\frac{4}{8}$ of $\frac{3}{4}$ to a single Fraction. *Facit* $\frac{60}{288}$.
5. Reduce $\frac{2}{3}$ of $\frac{1}{4}$ of $\frac{4}{5}$ to a single Fraction. *Facit* $\frac{24}{60}$.
6. Reduce $\frac{1}{2}$ of $\frac{8}{8}$ of $\frac{6}{7}$ to a single Fraction. *Facit* $\frac{48}{126}$.

CASE 6.

Q. *How do you reduce the* Fraction *of one* Denomination *to the* Fraction *of another, but greater, retaining the fame Value?*
A. 1. Reduce the given *Fraction* to a *compound Fraction*, by comparing it with all the *Denominations* between it, and that *Denomination*, which you would reduce it to.
2. Reduce that *compound Fraction* to a *fingle* one, by Cafe 5.

EXAM-

EXAMPLES.

1. Reduce $\frac{5}{6}$ of a Penny to the Fraction of a Pound. *Facit* $\frac{5}{1440}$ *l.*
2. Reduce $\frac{1}{2}$ of a Farthing to the Fraction of a Shilling. *Facit* $\frac{1}{96}$ *s.*
3. Reduce $\frac{8}{9}$ of an Ounce Troy, to the Fraction of a Pound. *Facit* $\frac{8}{108}$ *lb.*
4. Reduce $\frac{6}{7}$ of a Pound Avoirdupois to the Fraction of a C. *wt. Facit* $\frac{6}{784}$ C. *wt.*
5. Reduce $\frac{9}{13}$ of a Pint of Wine to the Fraction of a *bhd. Facit* $\frac{9}{6552}$ *bhd.*

CASE 7.

Q. How do you reduce the Fraction *of one* Denomination *to the* Fraction *of another, but less, retaining the same Value.*

A. Multiply the given *Numerator*, by the Parts of the *Denominations* between it, and that *Denomination* you would reduce the *Fraction* to, for a new *Numerator*, and place it over the given *Denominator*.

Note, *This Case, and* Case 6, *prove each other.*

EXAMPLES.

1. Reduce $\frac{5}{1440}$ of a Pound to the Fraction of a Penny. *Facit* $\frac{1200}{1440} = \frac{5}{6}$ *d.*
2. Reduce $\frac{1}{96}$ of a Shil. to the Fraction of a Farthing. *Facit* $\frac{1}{2}$ *qr.*
3. Reduce $\frac{8}{108}$ of a *lb.* Troy to the Fraction of an *Oz. Facit* $\frac{8}{9}$ *oz.*
4. Reduce $\frac{6}{784}$ of a C. *wt.* to the Fraction of a *lb. Facit* $\frac{6}{7}$ *lb.*
5. Reduce $\frac{9}{6552}$ of a *bhd.* of Wine to the Fraction of a Pint. *Facit* $\frac{9}{13}$ Pint.

CASE 8.

Q. How do you reduce Vulgar Fractions *from one* Denomination *to another of the same Value, having the* Numerator of the required Fraction given?

A.   As the *Numerator* of the given *Fraction*,
      Is to its *Denominator* :
      So is the *Numerator* of the intended *Fraction*,
      To its *Denominator*.

EXAMPLES.

1. Reduce $\frac{3}{4}$ to a Fraction of the same Value, whose Numerator shall be 15. *Facit* $\frac{15}{20} = \frac{3}{4}$.
2. Reduce $\frac{7}{8}$ to a Fraction of the same Value, whose Numerator shall be 42. *Facit* $\frac{42}{48}$.
3. Reduce $\frac{5}{7}$ to a Fraction of the same Value, whose Numerator shall be 34. *Facit* $\frac{34}{47}\frac{1}{5}$.
4. Reduce $\frac{5}{9}$ to a Fraction of the same Value, whose Numerator shall be 73. *Facit* $\frac{73}{131}\frac{2}{5}$.

Note, *From* Cases 8 and 9, *there arises a new* Fraction, *which may not improperly be called a mixt* Fraction.

CASE

CASE 9.

Q. *How do you reduce* Vulgar Fractions *from one* Denomination *to another of the ſame Value, having the* Denominator *of the* required Fraction *given?*

A.   As the *Denominator* of the given *Fraction,*
        Is to its *Numerator* :
        So is the *Denominator* of the intended *Fraction,*
        To its *Numerator.*

<div align="center">Note, <i>This</i> Caſe <i>and</i> Caſe 8, <i>prove each other.</i></div>

<div align="center">EXAMPLES.</div>

1. Reduce $\frac{3}{4}$ to a Fraction of the ſame Value, whoſe Denominator ſhall be 20.   *Facit* $\frac{15}{20} = \frac{3}{4}$.

2. Reduce $\frac{7}{8}$ to a Fraction of the ſame Value, whoſe Denominator ſhall be 49.   *Facit* $\frac{42}{49} \frac{7}{8}$.

3. Reduce $\frac{1}{4}$ to a Fraction of the ſame Value, whoſe Denominator ſhall be 46.   *Facit* $\frac{43}{46} \frac{2}{4}$.

4. Reduce $\frac{3}{5}$ to a Fraction of the ſame Value, whoſe Denominator ſhall be $131\frac{2}{3}$.   *Facit* $\frac{73}{131} \frac{2}{3}$.

CASE 10.

Q. *How is a* mixt Fraction *reduc'd to a* ſingle one?

A. 1. When the *Numerator* is the *integral* Part : Then

(1.) Multiply it by the *Denominator* of the *fractional* Part, and to that *Product* add the *Numerator* of the *fractional* Part, for a new *Numerator.*

(2.) Multiply the *Denominator* of the *Fraction* by the *Denominator* of the *fractional* Part of the *Numerator,* for a new *Denominator.*

<div align="center">Note, <i>This proves</i> Caſe 9.</div>

<div align="center">EXAMPLES.</div>

1. Reduce $\frac{4\frac{2}{4}}{9} \frac{7}{8}$ to a ſimple Fraction.   *Facit* $\frac{7}{8}$.
2. Reduce $\frac{3\frac{1}{4}}{26} \frac{1}{2}$ to a ſimple Fraction.   *Facit* $\frac{3}{4}$.
3. Reduce $\frac{17}{43} \frac{4}{9}$ to a ſimple Fraction.   *Facit* $\frac{157}{387}$.

2. When the *Denominator* is the *integral* Part : Then

(1.) Multiply it by the *Denominator* of the *fractional* Part, and to that *Product* add the *Numerator* of the *fractional* Part, for a new *Denominator.*

(2.) Multiply the *Numerator* of the *Fraction* by the *Denominator* of the *fractional* Part, for a new *Numerator.*

<div align="center">Note, <i>This proves</i> Caſe 8.</div>

<div align="center">EXAMPLES.</div>

1. Reduce $\frac{7}{1\frac{1}{1}} \frac{2}{5}$ to a ſimple Fraction.   *Facit* $\frac{365}{617} = \frac{5}{8}$.
2. Reduce $\frac{41}{73} \frac{1}{4}$ to a ſimple Fraction.   *Facit* $\frac{104}{293}$.
3. Reduce $\frac{7}{13} \frac{3}{5}$ to a ſimple Fraction.   *Facit* $\frac{15}{58} = \frac{5}{14}$.

<div align="right">CASE</div>

C A S E II.

Q. How do you find the proper Quantity of a Fraction in the known Parts of an Integer?

A. Multiply the *Numerator* by the common Parts of the *Integer,* and divide by the *Denominator.*

E X A M P L E S.

1. Reduce $\frac{2}{3}$ of a Pound Sterling to its proper Quantity. *Facit* 13 s. 4 d.

2. Reduce $\frac{18}{23}$ of a Shilling to its proper Quantity. *Facit* 5 d. $\frac{1}{23}$.

3. Reduce $\frac{6}{7}$ of 5 l. 9 s. to its proper Quantity. *Facit* 4 l. 13 s. 5 d. $\frac{1}{7}$.

4. Reduce $\frac{12}{16}$ of a *lb.* Troy to its proper Quantity. *Facit* 9 oz.

5. Reduce $\frac{12}{78}$ of a Ton Weight to its proper Quantity. *Facit* 3 C. 0 qrs. 8 lb. 9 oz. 13 dr. $\frac{42}{78}$.

6. Reduce $\frac{5}{9}$ of a *lb.* Avoirdupois to its proper Quantity. *Facit* 8 oz. 14 dr. $\frac{2}{9}$.

7. Reduce $\frac{9}{11}$ of 10 C. 1 qr. 12 lb. to its proper Quantity. *Facit* 8 C. 1 qr. 25 lb. 1 oz. 7 dr. $\frac{3}{11}$.

8. Reduce $\frac{4}{7}$ of a Mile to its proper Quantity. *Facit* 4 fur. 125 yds. 2 feet, 1 in. 2 bc. $\frac{1}{7}$.

9. Reduce $\frac{9}{16}$ of a Yard to its proper Quantity. *Facit* 2 feet, 8 in. 1 bc. $\frac{2}{16}$.

10. Reduce $\frac{4}{5}$ of an Ell English to its proper Quantity. *Facit* 1 Yard.

11. Reduce $\frac{7}{16}$ of an Acre to its proper Quantity. *Facit* 1 Rood, 30 Perches.

12. Reduce $\frac{4}{5}$ of a Tun of Wine to its proper Quantity. *Facit* 1 bhd. 49 galls.

13. Reduce $\frac{7}{6}$ of a Barrel of Beer to its proper Quantity. *Facit* 30 galls. $\frac{1}{4}$.

14. Reduce $\frac{3}{8}$ of a Chaldron of Coals to its proper Quantity. *Facit* 13 bush. $\frac{1}{2}$.

15. Reduce $\frac{2}{7}$ of a Quarter of Corn to its proper Quantity. *Facit* 2 bush. 1 peck $\frac{1}{7}$.

16. Reduce $\frac{7}{13}$ of a Day natural to its proper Quantity. *Facit* 12 hrs. 55 min. 23 sec. $\frac{1}{13}$.

17. Reduce $\frac{4}{5}$ of a Month to its proper Quantity. *Facit* 3 weeks, 1 day, 9 hrs. 36 min.

18. What is the proper Quantity of $\frac{7}{8}$ of a Yard of Cloth? *Answ.* 3 qrs. 2 na.

19. What is the proper Quantity of $\frac{2}{9}$ of a bhd. of Beer? *Answ.* 12 gals.

20. What is the proper Quantity of $\frac{3}{16}$ of a Barrel of Ale? *Answ.* 6 galls.

C A S E

CASE 12.

Q. *How do you reduce any given* Quantity *to the* Fraction *of any greater Denomination of the same kind ?*

A. 1. Reduce the given Quantity to the lowest Term mentioned for a *Numerator.*

2. Reduce the *integral* Part to the same Term for a *Denominator,* and that will be the *Fraction* required.

Note 1, *If there be a Fraction given with the said* Quantity, *let it be put to the* Numerator *of the Fraction required.*

2. Cases 11 and 12 *prove each other.*

EXAMPLES.

1. Reduce 13 s. 4 d. to the Fraction of a Pound Sterling. *Facit* $\frac{160}{248} = \frac{2}{3}$ l.

2. Reduce 5 d. $\frac{1}{43}$ to the Fraction of a Shilling. *Facit* $\frac{18}{43}$ s.

3. What Part of 5 l. 9 s. is 4 l. 13 s. 5 d. $\frac{1}{7}$? *Answ.* $\frac{6}{7}$.

4. Reduce 9 oz. Troy to the Fraction of a lb. *Facit* $\frac{9}{12} = \frac{3}{4}$ lb.

5. Reduce 3 C. 0 qr. 8 lb. 9 oz. 13 dr. $\frac{4\frac{3}{7}}{}$ to the Fraction of a Ton. *Facit* $\frac{12}{76}$ Ton.

6. Reduce 8 oz. 14 dr. $\frac{2}{9}$ to the Fraction of a lb. Avoirdupois. *Facit* $\frac{5}{9}$ lb.

7. What Part of 10 C. 1 qr. 12 lb. is 8 C. 1 qr. 25 lb. 1 oz. 7 dr. $\frac{3}{11}$? *Answ.* $\frac{9}{11}$ T.

8. Reduce 4 fur. 125 yds. 2 feet, 1 in. 2 bc. $\frac{1}{7}$ to the Fraction of a Mile. *Facit* $\frac{4}{9}$ Mile.

9. Reduce 2 feet, 8 in. 1 bc. $\frac{2}{10}$ to the Fraction of a Yard. *Facit* $\frac{9}{10}$ Yard.

10. Reduce 1 Yard to the Fraction of an Ell. *Facit* $\frac{4}{5}$ Ell.

11. Reduce 1 Rood, 30 Poles, to the Fraction of an Acre. *Facit* $\frac{7}{16}$ Acre.

12. Reduce 1 hhd. 49 galls. of Wine to the Fraction of a Tun. *Facit* $\frac{4}{9}$ Tun.

13. Reduce 31 galls. $\frac{1}{2}$ of Beer to the Fraction of a Barrel. *Facit* $\frac{7}{8}$ Barrel.

14. Reduce 13 bush. $\frac{1}{4}$ of Coals to the Fraction of a Chaldron. *Facit* $\frac{3}{4}$ Chaldron.

15. Reduce 2 bush. 1 peck $\frac{1}{7}$ of Corn to the Fraction of a Quarter. *Facit* $\frac{2}{7}$ Quarter.

16. Reduce 12 hrs. 55 min. 23 sec. $\frac{1}{13}$ to the Fraction of a Day natural. *Facit* $\frac{7}{13}$ Day.

17. Reduce 3 w. 1 d. 9 hrs. 36 min. to the Fraction of a Month. *Facit* $\frac{4}{5}$ Month.

18. Reduce 3 qrs. 2 na. to the Fraction of a Yard. *Facit* $\frac{7}{8}$ Yard.

19. Reduce

19. Reduce 12 *gals.* of Beer to the Fract. of a *Hhd. Facit* $1\frac{4}{18}$ *hhd.*
20. Reduce 6 *gals.* of Ale to the Fract. of a *Bar. Facit* $\frac{3}{16}$ *bar.*
21. Reduce 13 *hrs.* 30 *min.* to the Fraction of a Day.
Facit $\frac{810}{1440} = \frac{9}{16}$.

Of ADDITION of VULGAR FRACTIONS.

Q. HOW are Vulgar Fractions *added together?*
    A. 1. Reduce the given *Fractions* to a common Denominator.

    2. Add all the *Numerators* together for a new *Numerator;* under which subfcribe the common *Denominator.*

Note, *This Rule is proved by Subtraction, when two Fractions only are given.*

EXAMPLES.

1. Add $\frac{1}{2}$ and $\frac{7}{8}$ together. – – – – – – – *Facit* $1\frac{6}{16}$.
2. Add $\frac{7}{10}$ and $\frac{11}{12}$ and $\frac{4}{9}$ together. – – – – *Facit* $2\frac{66}{1080}$.
3. Add 19 and $7\frac{1}{2}$ of $\frac{2}{3}$ together. – – – – *Facit* $26\frac{2}{8}$.
4. Add $\frac{1}{2}$ of $\frac{7}{8}$ and $\frac{2}{3}$ of $\frac{19}{10}$ together. – – *Facit* $1\frac{68}{960}$.
5. Add $\frac{1}{3}$ of 95 and $\frac{7}{8}$ of 14 together – – – *Facit* $43\frac{22}{24}$.
6. Add $\frac{2}{3}$ and $17\frac{1}{2}$ together. – – – – – – *Facit* $18\frac{1}{7}$.
7. Add $12\frac{1}{4}$ and $3\frac{2}{3}$ and $4\frac{1}{4}$ together. – – – *Facit* $20\frac{22}{24}$.
8. Add $6\frac{7}{8}$ of $\frac{9}{10}$ and $\frac{4}{7}$ of $\frac{1}{2}$ and $7\frac{1}{2}$ together. *Facit* $14\frac{1284}{2220}$.

Note, *In order to find the following* Facits, *the Fractions given muft be re-duced to their proper* Quantities *by Cafe* 11, *in Reduction, and then added, as in Addition of whole Numbers.*

    9. Add $\frac{7}{8}$ of a Pound to $\frac{3}{4}$ of a Shilling. *Facit* 18 *s.* 3 *d.*
10. Add $\frac{1}{4}$ of a Penny to $\frac{1}{9}$ of a Pound. *Facit* 2 *s.* 3 *d.* 1 *qr.* $\frac{6}{9}$.
11. Add $\frac{1}{2}$ of a *lb.* Troy to $\frac{7}{12}$ of an *oz. Facit* 6 *oz.* 11 *dwts.* 16 *gr.*
12. Add $\frac{4}{7}$ of a Tun to $\frac{9}{10}$ of an *C. wt. Facit* 12 *C.* 3 *qr.* 8 *lb.* 12 *oz.* 12 *dr.* $\frac{8}{10}$.
13. Add $\frac{3}{4}$ of a Mile to $\frac{7}{10}$ of a Furlong. *Facit* 6 *Fur.* 28 *Poles.*
14. Add $\frac{1}{4}$ of a Yard to $\frac{2}{7}$ of a Foot. *Facit* 2 *feet,* 2 *in.*
15. Add $\frac{1}{3}$ of a Day to $\frac{1}{4}$ of an Hour. *Facit* 8 *hrs.* 30 *min.*
16. Add $\frac{4}{5}$ of a Chaldron to $\frac{7}{9}$ of a Bufh. *Facit* 16 *bufh.* 3 *pecks* $\frac{1}{2}$.
17. Add $\frac{1}{3}$ of a Week, $\frac{1}{4}$ of a Day, and $\frac{1}{2}$ of an Hour together. *Facit* 2 *days,* 14 *hrs.* $\frac{1}{2}$.
18. Add $\frac{2}{3}$ of a Yard, $\frac{3}{4}$ of a Foot, and $\frac{7}{8}$ of a Mile together. *Facit* 1540 *yds.* 2 *feet,* 9 *in.*

Of SUBTRACTION of VULGAR FRACTIONS.

Q. HOW are Vulgar Fractions *fubtracted?*
    A. 1. Reduce the given *Fractions* to a common Denominator.

    2. *Subtract* the leffer *Numerator* from the greater, and place that Diff. over the common *Denominator.*   3. When

3. When the lower *Fraction* is greater than the upper, subtract the *Numerator* of the lower Fraction from the *Denominator*, and to that Difference add the upper *Numerator* carrying one to the *Units* Place of the lower whole Number.

Note, *This Rule is proved by* Addition.

E X A M P L E S.

1. From $\frac{111}{112}$ take $\frac{3}{4}$. — — — — *Facit* $\frac{108}{448}$.
2. From $\frac{27}{100}$ take $\frac{3}{7}$. — — — — *Facit* $\frac{379}{700}$.
3. From $96\frac{1}{3}$ take $14\frac{3}{7}$ — — — *Facit* $81\frac{19}{21}$.
4. From 96 take $\frac{1}{3}$ — — — — — *Facit* $95\frac{2}{3}$.
5. From $\frac{1}{3}$ of 76 take $\frac{1}{3}$ of 21.— *Facit* $9\frac{7}{12}$.
6. From $\frac{109}{110}$ take $\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{3}{4}$.— *Facit* $\frac{1956}{2640}$.
7. From $71\frac{1}{2}$ take $\frac{17}{19}$. — — — *Facit* $70\frac{23}{38}$.
8. From $14\frac{1}{4}$ take $\frac{2}{3}$ of 19. — — *Facit* $1\frac{7}{12}$.

Note, *In order to find the following* Facits, *the* Fractions *given must be reduced to their proper* Quantities *by* Case 11, *in* Reduction, *and then subtracted, as in* Subtraction *of* whole Numbers.

9. From $\frac{1}{2}$ of a Pound take $\frac{3}{4}$ of a Shilling. *Facit* 9*s.* 3 *d.*
10. From $\frac{1}{2}$ of a Shilling take $\frac{3}{4}$ of a Penny. *Facit* 5 *d.* $\frac{1}{4}$.
11. From $\frac{1}{3}$ of an *oz.* take $\frac{7}{8}$ of a *dwt.* *Facit* 11 *dwts.* 3 *gr.*
12. From $\frac{1}{4}$ of an *C. wt.* take $\frac{7}{12}$ of a Pound. *Facit* 1 *qr.* 27 *lb.* 6 *oz.* 10 *dr.* $\frac{8}{12}$.
13. From $\frac{2}{3}$ of a League take $\frac{7}{10}$ of a Mile. *Facit* 1 *mile,* 2 *fur.* 16 *poles.*
14. From 1 Ell take $\frac{7}{10}$ of a *qr.* *Facit* 1 *yd.* 0 *qr.* 1 *na.* $\frac{2}{10}$.
15. From $\frac{3}{12}$ of a *hhd.* of Beer take 1 Gallon. *Facit* 12 *gall* $\frac{1}{2}$.
16. From $\frac{3}{8}$ of a Chaldron take $\frac{2}{3}$ of a Bushel. *Facit* 17 *bush.* 1 *peck* $\frac{1}{3}$.
17. From 7 Weeks take 9 Days $\frac{7}{10}$. *Facit* 5 *wks.* 4 *days,* 7 *hrs.* 12 *min.*
18. From 4 *days* 7 *hrs.* $\frac{1}{2}$, take 1 *day* 9 *hrs.* $\frac{3}{8}$. *Facit* 2 *days,* 22 *hrs.* $\frac{1}{3}$.

Of MULTIPLICATION *of* VULGAR FRACTIONS.

Q. **H**OW are Vulgar Fractions *multiplied?*
  A. 1. Prepare the given Numbers (if need be) by the Rules of *Reduction.*

2. Multiply all the given *Numerators* for a new *Numerator,* and all the *Denominators* for a new *Denominator.*

Note, *When any* Number, *either* whole *or* mixt, *is* multiply'd *by a* Fraction, *the* Product *is always* less *than the* Multiplicand, *in the same* Proportion *as the* multiplying Fraction *is* less *than* 1 *or an* Unit.

E X A M-

EXAMPLES.

1. Multiply $\frac{2}{7}$ by $\frac{3}{11}$ - - - Facit $\frac{9}{77}$.
2. Multiply $\frac{4}{8}$ by $\frac{7}{9}$ - - - Facit $\frac{28}{72}$.
3. Multiply $\frac{2}{3}$ of $\frac{4}{5}$ by $\frac{7}{10}$ of $\frac{11}{13}$ - Facit $\frac{308}{1800}$.
4. Multiply $7\frac{1}{4}$ by $8\frac{1}{2}$ - - - Facit $61\frac{5}{8}$.
5. Multiply $4\frac{1}{2}$ by $\frac{1}{8}$ - - - Facit $\frac{9}{16}$.
6. Multiply $\frac{7}{8}$ by $13\frac{9}{10}$ - - Facit $12\frac{13}{80}$.
7. Multiply $\frac{1}{2}$ of 7 by $\frac{1}{6}\frac{1}{2}$ - - - Facit $1\frac{9}{12}$.
8. Multiply $\frac{3}{4}$ of 8 by $\frac{7}{8}$ of 5 - - Facit 21.
9. Multiply $\frac{3}{4}$ by $\frac{4}{9}$ of 11 - Facit $2\frac{24}{54}$.
10. Multiply $\frac{4}{5}$ of 91 by $71\frac{1}{2}$ - - Facit $5205\frac{2}{10}$.
11. Multiply $12\frac{1}{3}$ by $\frac{2}{6}$ of 7 - Facit $29\frac{13}{30}$.
12. Multiply $7\frac{1}{2}$ by $9\frac{1}{4}$ - - - Facit $69\frac{3}{8}$.

Of DIVISION *of* VULGAR FRACTIONS.

Q. HOW are Vulgar Fractions *divided?*
    A. 1. Prepare the Numbers given (if need be) by the Rules of *Reduction.*

    2. Multiply the *Denominator* of the *Divisor* into the *Numerator* of the *Dividend*, for a new *Numerator*; and the *Numerator* of the *Divisor* into the *Denominator* of the *Dividend*, for a new *Denominator.*

Note 1, *When the* Dividend *is greater than the* Divisor, *the* Quotient *will be greater than the* Dividend : *But when the* Dividend *is less than the* Divisor, *then the* Quotient *will be less than the* Dividend, *and in the same Proportion as an* Unit *is greater or less than the dividing* Fraction.

    2. Multiplication *and* Division *prove each other.*

EXAMPLES.

1. Divide $\frac{17}{21}$ by $\frac{1}{3}$ - - Facit $1\frac{22}{63}$.
2. Divide $\frac{11}{19}$ by $\frac{7}{9}$ - - Facit $\frac{117}{138}$.
3. Divide $\frac{14}{18}$ by $\frac{7}{10}$ - - Facit $1\frac{14}{126}$.
4. Divide $1\frac{1}{2}$ by $4\frac{8}{10}$ - Facit $\frac{30}{96}$.
5. Divide $\frac{7}{8}$ by 4 - - Facit $\frac{7}{32}$.
6. Divide 4   by $\frac{7}{8}$ - - Facit $4\frac{4}{7}$.
7. Divide 99   by 108 - - Facit $\frac{99}{108}$.
8. Divide $\frac{1}{2}$ of 19 by $\frac{2}{3}$ of $\frac{3}{4}$ - Facit $7\frac{8}{10}$.
9. Divide $\frac{1}{2}$ of $\frac{2}{3}$ by $\frac{3}{2}$ of $\frac{3}{4}$ - Facit $\frac{24}{36}$.
10. Divide $\frac{2}{3}$ of $\frac{3}{4}$ by $\frac{1}{2}$ of $\frac{2}{3}$ - Facit $1\frac{12}{24}$.
11. Divide $4\frac{5}{6}$ by $\frac{5}{6}$ of 4 - Facit $2\frac{1}{10}$.
12. Divide $\frac{1}{9}$ of 4 by $4\frac{5}{9}$ - - - Facit $\frac{20}{41}$.

Of

Of the SINGLE RULE of THREE DIRECT
in VULGAR FRACTIONS.

Q. HOW *is the* Rule *of* Three *in* Fractions *perform'd?*
 A. The Operations of the *Rule* of *Three* in *Fractions,*
both *Single* and *Double, Vulgar* and *Decimal,* are exactly agreeable
to the Principles laid down in the fame Rules in wholeNumbers.
 Q. *How are the following Examples proved?*
 A. By changing the Order of them.

EXAMPLES.

1. If $\frac{11}{13}$ *lb.* of Sugar coft $\frac{7}{15}$ of a Shilling, what coft $\frac{32}{43}$ *ll.* ?
Anfw. $\frac{2912}{7095}$ *s.* = 4 *d.* 3 *qrs.* $\frac{4971}{7095}$.

2. If $\frac{3}{4}$ Ell coft $\frac{2}{7}$ *l.* what coft $\frac{11}{17}$ Ell ? *Anfw.* 15 *s.* 8 *d.* $\frac{16}{161}$.

3. If $\frac{4}{7}$ Ell coft $\frac{7}{13}$ *l.* what coft 1 Ell ? *Anfw.* 18 *s.* 10 *d.* $\frac{6}{52}$.

4. If 2 *oz.* of Silver coft 16 *s.* 5 *d.* what coft $\frac{1}{4}$ *oz.* ? *Anfw.*
6 *s.* 1 *d.* 3 *qrs.* $\frac{1}{2}$.

5. If 6 Yards $\frac{1}{2}$ coft 18 *s.* what coft 9 Yards $\frac{1}{4}$? *Anfw.*
1 *l.* 5 *s.* 7 *d.* 1 *qr* $\frac{28}{32}$.

6. If 1 Dollar be worth 56 *d.* $\frac{3}{5}$, what are 500 Dollars worth ?
Anfw. 117 *l.* 18 *s.* 4 *d.*

7. If 1 *yd.* $\frac{1}{3}$ coft 9 *s.* what coft 16 *yds.* $\frac{1}{4}$? *Anfw.* 5 *l.* 17 *s.*

8. If 1 Piftole be 17 *s.* $\frac{1}{5}$, what are 100 Piftoles ? *Anfw.* 80 *l.*

9. If $\frac{3}{4}$ *oz.* coft $\frac{11}{12}$ *l.* what coft 1 *oz* ? *Anfw.* 1 *l.* 5 *s.* 8 *d.*

10. If an Ingot of Silver weighs 16 *oz.* $\frac{11}{15}$, what is it worth
at 5 *s.* 6 *d. per oz.* ? *Anfw.* 4 *l.* 12 *s.* 0 *d.* 1 *qr.* $\frac{9}{15}$.

11. If $\frac{9}{10}$ C. coft 14 *l.* 4 *s.* what will 7 C. $\frac{1}{2}$ coft ? *Anfw.*
118 *l.* 6 *s.* 8 *d.*

12. If $\frac{2}{5}$ of an Ell coft $\frac{2}{3}$ of 19 *s.* what coft 7 Ells ? *Anfw.*
7 *l.* 7 *s.* 9 *d.* 1 *qr.* $\frac{3}{8}$.

13. If 8 *lb.* of Tobacco coft 4 *s.* 9 *d.* $\frac{1}{3}$, what coft 1 *lb.* ?
Anfw. 7 *d.* $\frac{1}{4}$.

14. If 1 *yd.* of broad Cloth coft 15 *s.* $\frac{3}{5}$, what will 4 Pieces,
each containing 27 *yds.* $\frac{1}{4}$ coft ? *Anfw.* 85 *l.* 10 *s.* 11 *d.* $\frac{1}{2}$.

15 A Mercer bought 3 Pieces $\frac{1}{2}$ of Silk, each containing
24 *Yards* $\frac{1}{3}$ at 6 *s.* 0 *d.* $\frac{1}{2}$ *per* Yard; I demand the Value of the
3 Pieces $\frac{1}{2}$ at that Rate ? *Anfw.* 25 *l.* 14 *s.* 6 *d.* 2 *qrs.* $\frac{4}{12}$.

16. If $\frac{1}{3}$ *lb.* lefs by $\frac{1}{6}$ coft 13 *d.* $\frac{2}{5}$, what coft 14 *lb.* lefs by
$\frac{1}{3}$ of 2 *lb. Anfw.* 4 *l.* 9 *s.* 9 *d.* $\frac{2}{15}$.

17. A Merchant had 5 C. $\frac{1}{9}$ of Sugar, at 6 *d.* $\frac{3}{4}$ *per lb.*
which he would barter for Tea, at 8 *s.* $\frac{2}{5}$ *per lb.* I demand how
much Tea muft be given for the Sugar ? *Anfw.* 43 *lb.* $\frac{6}{212}$.

18. Bought 12 *clb.* of Tea, at 8 *s.* $\frac{3}{5}$ *per lb.* and fold it for 70 *l.*
what was the Gain *per Cent.* ? *Anfw.* 35 *l.* 5 *s.* 3 *d.* 3 *qrs.* $\frac{71}{1015}$.

G

Of

Of the SINGLE RULE of THREE INVERSE in VULGAR FRACTIONS.

1. IF $3\frac{1}{4}$ Yards of Cloth that is $1\frac{1}{5}$ Yard wide, be fufficient to make a Cloke; how much muft I have of that fort which is $\frac{4}{5}$ of a Yard wide to make a Cloke of the fame Bignefs? *Anfw.* $4\frac{7}{8}$ *Yards.*

2. If 16 Men finifh a Piece of Work in $28\frac{1}{3}$ Days, how long will 12 Men require to do the fame Work? *Anfw.* $37\frac{28}{36}$ *Days.*

3. If $1\frac{1}{4}$ Yard in Breadth require $20\frac{1}{2}$ Yards long to make a Garment; what Length will $\frac{3}{4}$ of a Yard wide require to make the fame? *Anfw.* $34\frac{4}{24}$.

4. How many Pieces of Merchandize, at 20 s. $\frac{1}{8}$ per Piece, are to be given for 240 Pieces $\frac{1}{7}$, at 12 s. $\frac{1}{2}$ per Piece? *Anfw.* $149\frac{354}{2252}$ *Pieces.*

5. How many Yards of Canvas that is 1 Yard $\frac{1}{4}$ wide, will be fufficient to line 20 Yards of Say, that is $\frac{3}{4}$ of a Yard wide? *Anfw.* 12 *Yards of Canvas.*

Of the DOUBLE RULE of THREE in VULGAR FRACTIONS.

1. IF 9 Students fpend 10 *l.* $\frac{7}{9}$ in 18 Days; how much will 20 Students fpend in 30 Days? *Anfw.* 39 *l.* 18 s. 4 $d.\frac{360}{1455}$.

2. Three Men having work'd 19 Days $\frac{1}{2}$, receiv'd 8 *l.* $\frac{9}{16}$, how much muft 20 Men have for 100 Days $\frac{1}{4}$? *Anfw.* 305 *l.* 0 s. 8 $d.+$

3. A Man and his Wife having laboured 1 Day, earned 4 s. $\frac{5}{8}$; I demand how much they muft have for 10 Days $\frac{1}{2}$, when their two Sons helped them? *Anfw.* 4 *l.* 17 s. 1 $d.\frac{1}{2}$.

4. A Man with his Family, which in all were 5 Perfons, did ufually drink 7 Gallons $\frac{4}{5}$ of Beer in a Week; how much will be drank in 22 Weeks $\frac{1}{2}$, when 3 Perfons more come into the Family? *Anfw.* $280\frac{40}{50}$ *galls.*

5. Seven Men with their Wives, upon examining into their Expenfes for 20 Weeks paft, found that they had laid out 40 *l.* $\frac{4}{5}$. I demand in what Time 20 *l.* $\frac{1}{3}$ may be fpent by 46 Men in the like Proportion? *Anfw.* 3 *weeks* $\frac{3136}{65688}$.

6. Three Sailors having been abroad 9 Months $\frac{1}{4}$, received 40 *l.* $\frac{3}{13}$; I demand how much 100 Sailors muft receive for 28 Months $\frac{3}{7}$ Service? *Anfw.* 4118 *l.* 6 s. 0 $d.\frac{1}{4}+$

THE

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Schoolmasters Assistant.

PART III.

Of DECIMAL-FRACTIONS.

Q. *WHAT do you understand by* Decimals *in general?*

A. Any Thing which is called *One*; as one *Foot*, one *Pound*, one *Shilling*, one *Year*, &c. is conceived in Imagination to be divided into *ten* equal Parts, and every one of those Parts into *ten* other equal *Parts*; and so on, by a *Decimal* Division, without End.

Q. *What is a* Decimal Fraction?

A. Any Number having a Point placed before it, thus, .641 is a Decimal.

Q. *How do you distinguish a* whole Number *from a* Decimal Fraction?

A. Any Number having a Point placed after it, thus, 641. is a whole *Number*.

Q. *What is a mixt* Number?

A. Any Quantity of Figures having a Point placed somewhere between them, thus 6.41, or thus 64.1; is a mixt Number.

Note, *The* Decimal Point *must never be omitted; because without it a* Decimal *cannot be distinguished from a* whole *or* mixt Number. *But when a* whole Number *alone is given, it is as common to omit it as to insert it; as appears by several* Examples *following.*

Of NOTATION of DECIMALS.

Q. *HOW do* Decimal Places *increase?*

A. In the same Manner as whole Numbers do: that is, by *Tens*: For every Place towards the left Hand is ten times greater than that which is next it towards the right Hand, as appears by the following *Table.*

TABLE.

TABLE.

	C. Thouſands	X. Thouſands	Thouſands	Hundreds	Tens	Units	Tenth Parts	Hundredth Parts	Thouſandth Parts	X. Thouſanth Parts	C. Thouſandth Parts
	6	5	4	3	2	1.	2	3	4	5	6

Q. *May not* Cyphers *ſometimes be annexed to* Decimals ?

A. They may; but they alter not their Value: Thus .41 and .4100 are the ſame.

Q. *May not* Cyphers *ſometimes be prefixed to* Decimal Parts ?

A. Yes; and then they decreaſe their Value, by removing them farther from the Point; Thus .0041 is leſs than .41

Of ADDITION *and* SUBTRACTION
of DECIMALS.

Q. HOW are Decimals *added or ſubtracted?*

A. Place the Numbers according to their Value, and work as in *Addition* or *Subtraction* of whole Numbers.

Q. *How are the Operations proved?*

A. As in whole Numbers.

EXAMPLES *in* ADDITION.

Shilling.	Yds.	Galls.	£
14.471	.47.4	7004.16	71.001
1.191	19.71	712.712	120.07
1.8126	461.721	19 0174	31.121
3.6126	400.004	7.3126	13 4101
7.1281	7.1004	71.1851	76.04
18.8126	7.07	3.108	7.3

Miles.

Miles.	lb.	Acres.	Ounces.
41.8102	86 18104	.61271	48.9108
140.037	3.14	.8712	1.8191
18.10	1.181	.012	3.1080
7.8141	7.7121	.87	.7012
16 4612	8 19817	.04	.0012
7.81	13.071	.4	.0018

EXAMPLES *in* SUBTRACTION.

	Years.	Days.	Weeks.	Hours.
From	1081.761	712.10009	127.19	12.
Take	10.00012	7.121	121.	.12
Rem.				

	Minutes.	Months.	Ells.	Tuns.
From	174.1	6100.	.172618	761.8109
Take	1.471	6.109	.0000148	18 9112
Rem.				

Of MULTIPLICATION of DECIMALS.

Q. HOW are Decimals *multiplied?*
A. As whole Numbers are.

Note 1. *When Numbers are multiplied, make as many Decimal Parts in the Product, as there are in the two Factors taken together.*

2. *If Decimal Places are wanted in the Product, supply them with Cyphers to the Decimal Point.*

3. *Observe the same Note here, which is given in Multiplication of Vulgar Fractions.*

Q. *How are the following Examples proved?*
A. By inverting the *Factors.*

G 3   EXAM-

EXAMPLES.

1. Multiply .612   by 4.12 | 8. Multiply .00041 by .00017
2. Multiply 48.   by .48 | 9. Multiply .0027 by 41.
3. Multiply 37.9   by 46.5 | 10. Multiply 410.   by .0012
4. Multiply .121   by 17.2 | 11. Multiply .07   by 07
5. Multiply 1.81 - by 71. | 12. Multiply 1.007 by .041
6. Multiply 4.1   by .142 | 13. Multiply 4.001 by .004
7. Multiply .0007 by .121 | 14. Multiply .004   by .004

Of DIVISION of DECIMALS.

Q. HOW are Decimals *divided?*
A. As whole Numbers are.

Note 1. The Decimal Places *of the* Divisor *and* Quotient *must always be equal to those in the* Dividend.

2. *If there be more* Decimals *in the* Divisor, *than in the* Dividend, *annex as many* Cyphers *as you please to the* Dividend, *so as to be equal at least to the* Divisor.

3. *If* Decimal Places *are wanting in the* Quotient, *they must be supplied with* Cyphers *to the* Decimal Point.

4. *Observe the same* Note *here, which is given in* Division *of* Vulgar Fractions.

Q *How are the following* Examples *proved?*
A. By *Multiplication.*

EXAMPLES.

1. Divide 19.4   by 37.5 | 7. Divide 9. - - - by .7121
2. Divide 47121.1 by 47. | 8. Divide 9. - - - by .9
3. Divide 4.18   by .1812 | 9. Divide 14.- - - by 47.31
4. Divide .76121   by 41. | 10. Divide 1. - - - by 863.
5. Divide .612821 by 7.21 | 11. Divide .012181 by .12
6. Divide .121819 by .721 | 12. Divide .0001212 by .018

Of REDUCTION of DECIMALS.

CASE I.

Q. HOW do you *reduce a* Vulgar Fraction *to a* Decimal?
A. Divide the *upper* Term by the *lower.*

Note 1. Both Terms *are to be esteemed* whole Numbers.

2. *By this* Case, Tables *containing the* Decimal Parts *of an* Integer *are constructed*

EXAMPLES.

1. Reduce $\frac{5}{26}$ to a Decimal. - - - *Facit* .1923076+
2. Reduce $\frac{5}{28}$ to a Decimal. - - - *Facit* .1785714+

3. Reduce

3. Reduce $\frac{11}{12}$ of $\frac{10}{13}$ to a Decimal. *Facit* .6043956+

4. Reduce 7 ſ. 6 d. to the Decimal of a Pound. *Facit* .375 *l.*

5. Reduce 10 ſ. 9 d. $\frac{1}{4}$ to the Decimal of a Pound. *Facit* .5385416+ *l.*

6. Reduce 24 Grains to the Decimal of a *lb.* Troy. *Facit* .0041666+ *lb.*

7. Reduce 14 Drams to the Decimal of a *lb.* Avoirdupois. *Facit* 0546875 *lb.*

8. Reduce 4 C. 2 qrs. to the Decimal of a Ton *Facit* .225 *Ton.*

9. Reduce 14 C. to the Decimal of a Ton *Facit* .7 *Ton.*

10. Reduce 174 Drams to the Decimal of an C. *Facit* .0060686+ *C.*

11. Reduce 4 Inches to the Decimal of a Yard. *Facit* .1111111+ *Yard*

12. Reduce 76 Yards to the Decimal of a Mile. *Facit* .04318181+ *Mile.*

13. Reduce 1 Mile to the Decimal of a League. *Facit* .33333333+ *League.*

14. Reduce 3 qrs. 2 na. to the Decimal of a Yard. *Facit* .875 *yd.*

15. Reduce 4 Perches to the Decimal of an Acre. *Facit* .025 *Acre.*

16. Reduce 1 Pint to the Decimal of a Gallon. *Facit* .125 *gall.*

17. Reduce 1 Gallon of Wine to the Decimal of a *hhd.* *Facit* .015873+ *hhd.*

18. Reduce 7 Minutes to the Decimal of a Day. *Facit* .0048611+ *Day.*

19. Reduce 2 Days to the Decimal of a Week. *Facit* .2857142+ *Week.*

20. Reduce 72 Days to the Decimal of a Year. *Facit* .1972602+ *Year.*

CASE 2.

Q. How do you find the proper Quantity *of a* Decimal Fraction *in the known Parts of an* Integer?

A. Multiply it by the common Parts of the *Integer.*

Q. How do you prove Queſtions *in this* Caſe?

A. By *Caſe* 1.

EXAMPLES.

1. What is the proper Quantity of .75 of a Pound? *Anſw.* 15 ſ. 2 d. 1.6 qr.

2. What is the proper Quantity of .861 of a C. wt. *Anſw.* 3 qrs. 12 lb. 6 oz 14.592 dr.

3. What is the proper Quantity of .461 of a Shilling? *Anſw.* 5 d. 2.128 qrs.   G 4   4. What

4. What is the proper Quantity of .761 of a *hhd.* of Wine ? *Answ.* 47 *galls.* 3 *qts.* 1.544 *pt.*

5. What is the proper Quantity of .17 of a Tun of Wine ? *Answ.* 42 *galls.* 3.36 *qts.*

6. What is the proper Quantity of .761 of a Day ? *Answ.* 18 *hrs.* 15 *min.* 50.4 *fec.*

7. What is the proper Quantity of .7 of a *lb.* of Silver ? *Answ.* 8 *oz.* 8 *dwts.*

8. What is the proper Quantity of .71 of 4 *oz.* of Gold ? *Answ.* 2 *oz.* 16 *dwts.* 19.2 *gr.*

9. What is the proper Quantity of .67 of a League ? *Answ.* 2 *miles,* 0 *fur.* 3 *poles,* 1 *yd.* 0 *feet,* 3 *in.* 1.8 *bc.*

10. What is the proper Quantity of .712 of a Furlong ? *Answ.* 28 *poles,* 2 *yds.* 1 *foot,* 11.04 *in.*

11. What is the proper Quantity of .07 of a Barrel of Ale ? *Answ* 2 *galls.* 1.92 *pt.*

12. What is the proper Quantity of .4712 of an Ell *English ? Answ.* 2 *qrs.* 1.424 *na.*

13. What is the proper Quantity of .72 of a *hhd* of Beer ? *Answ.* 38 *galls.* 3.52 *qts.*

14. What is the proper Quantity of .61 of a Tun of Wine ? *Answ.* 2 *hhds.* 27 *galls.* 2 *qts.* 1.76 *pt.*

15. What is the proper Quantity of .092 of 3 Acres, 2 Roods ? *Answ.* 1 *Rood,* 11.52 *Poles*

16. What is the proper Quantity of .461 of a Chaldron of Coals? *Answ.* 16 *bush.* 2.384 *pecks.*

17. What is the proper Quantity of .712 of 3 *qrs.* of Corn ? *Answ.* 17 *bush.* 2.816 *qts.*

18. What is the proper Quantity of .3 of a Year ? *Answ.* 109 *Days,* 12 *hrs.*

19. What is the proper Quantity of .5 of an Hour ? *Answ.* 30 *m.*

20. A certain Tenant hired an House for 9 Years at 12.4 *l.* *per Annum* ; how much was due at the End of the Term ? *Answ.* 111 *l.* 12 *s*

Note 1, *To this Cafe is referred* Cafe 4, *in* Practice, *p.* 55.

EXAMPLE.

1286 at 4 s.

1st.   4 s. = .2 l.
2d.   1286

    .2   *Facit* 257 *l.* 4 s.

257 2
   20

4.0

2. Addition *and* Subtraction *of* Demimals *of different Denominations, may easily be perform'd, after the* Decimals *are reduced to their proper Quantities.*

EXAM-

EXAMPLES.

1. What is the Sum of .48 *l.* and .16 *s.* reduced to their proper Quantities? *Anfw.* 9 *s.* 9.12 *d.*

2. What is the Sum of .17 *lb* Troy, and .84 *oz.*? *Anfw.* 2 *oz.* 17 *dwt.* 14.4 *gr.*

3. What is the Sum of 17 Ton, .19 C. .17 *qr.* and .7 *lb.*? *Anfw.* 3 C. 2 *qrs.* 15 54 *lb.*

4. What is the Difference between .17 *l* and .7 *s.*? *Anfw.* 2 *s.* 8 *d.* 1.6 *qr.*

5. What is the Difference between .41 Day and .16 Hours? *Anfw.* 9 *hrs.* 40 *min.* 48 *fec.*

Of the SINGLE RULE of THREE DIRECT in DECIMALS.

Q. HOW do you prove the following Queftions?
A. By changing their Order.

EXAMPLES.

1. If 1.4 *lb.* of Mace coft 14 5 *s.* what coft 75.31 *lb.*? *Anfw.* 38 *l.* 19 *s.* 11 *d.* 3.52 *qrs.*

2. If 1.6 C. of Sugar coft 3 *l.* 12.76 *s.* what coft 3 *hhds.* each 11 C. 3 *qrs.* 10.12 *lb.*? *Anfw.* 80 *l.* 15 *s.* 3 *d.* 3.36 *qrs.*

3. If 1.5 *oz.* of Silver be worth 7.8 *s.* what is the Value of 9.7 *lb*? *Anfw.* 30 *l.* 5 *s.* 3 *d.* 1.44 *qr.*

4. If 1.37 C. of Sugar be worth 4.5 *l.* what is 1.7 *lb.* worth at that Rate? *Anfw.* 11.1 *d.*

5. If 1 Pint of Wine coft 1.2 *s.* what coft 12.5 *hhds.*? *Anfw.* 378 *l.*

6. If 8.4 *lb.* of Tobacco coft 16 *s.* 4.6 *d.* what coft 3 *hhds.* each 4 C. 2 *qrs.* 7.4 *lb.*? *Anfw.* 149 *l.* 12 *s.* 3 *d.* 2 *qrs.*

7. If 1 Yard of Cloth coft 12.3 *s.* what coft 3 Pieces, each 21.5 Yards? *Anfw.* 39 *l.* 13 *s.* 4.2 *d.*

8. A Man bought a Piece of Cloth for 6 *l.* 13.12 *s.* I demand how many Yards there were in the fame, when he gave after the Rate of 4 *s.* 2.6 *d* per Yard? *Anfw.* 31.569 Yards.

9. A Man bought 5.8 Tuns of Oil for 60.4 *l.* but by Misfortune it chanced to leak out 50.9 Gallons: I demand how he muft fell the reft *per* Gallon to be no lofer? *Anfw.* 10.27 *d.* *per Gallon.*

10. Two

10. Two Men bartered, *A* had 40.7 *Yds.* of Linen, for which *B* gave him 25.6 Ells of Holland, at 4.5 *s. per* Ell; I demand the Price of the Linen *per* Yard? *Answ.* 2 *s.* 9 *d.* 3.8 *qr.*

11. A Grocer bought 7 6 *C.* of Sugar, at 40.1 *s. per C.* and fold the fame out at 4.5 *d. per lb.* I demand whether he gained or loft, and how much? *Answ.* 14 *s.* 5 *d.* 1.12 *qr.* gain.

12. A Brewer made a Quantity of Beer, which coft him 90.4 *l.* and afterwards fold it out at 26.7 *s. per* Barrel, by which he gain'd 10 *l.* I demand the Quantity that was brewed? *Answ.* 75 *Bar.* 7.4+*Gall.*

13. A Grocer bought 3 *C.* 1.5 *qr.* of Cloves, at the Rate of 2.75 *s. per lb.* and fold them for 60 *l.* 11 *s.* 6 *d.* what did he gain or lofe by the Bargain? *Answ. He gain'd 8 l. 12 s.*

14. A Merchant bought 436 Yards of Cloth for 8.5 *s. per* Yard, and fold it again for 10.75 *s. per* Yard; what did he gain by the Sale thereof? *Answ.* 49 *l.* 1 *s.* gain.

15. *A* owes *B* 296.85 *l.* but he compounds for 7.5 *s.* in the Pound; what muft *B* receive for his Debt? *Answ.* 111 *l.* 6 *s.* 4 *d.* 2 *qrs.*

16. Bought 3 *hhds.* of Tobacco, each weighing 4 *C.* 1.9 *qr.* at 5.6 *l. per C.* which I fold out at 7 *l.* 16 *s. per C.* what did I gain by the Whole? *Answ.* 29 *l.* 10 *s.* 8 *d.* 1.6 *qr.*

17. A Jeweller bought a Diamond for 60 Guineas; and after it was neatly cut, weighed 1.5 *oz.* which he fold again for 3.25 *s. per* Grain; I demand how much he gain'd by the faid Diamond; and alfo at what Rate *per Cent.* he made his Gain?

$$Answ. \begin{cases} Whole\ Gain - 54\ l.\ 0\ s.\ 0\ d.\ 0\ qr. \\ Gain\ per\ Cent.\ 85\quad 14\quad 3\quad 1.7+ \end{cases}$$

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Of

Of CONVERGI[...]

OR,

Extracting the ROOTS

A TABLE of

		1	2	3	4
Roots, - - - - - - or First Powers - -		1	2	3	4
Squares, - - - - - - or Second Powers -		1	4	9	16
Cubes, - - - - - - or Third Powers -		1	8	27	64
Biquadrates, - - - - or Fourth Powers -		1	16	81	256
Surfolids, - - - - - or Fifth Powers -		1	32	243	1024
Square Cubes, - - - - or Sixth Powers -		1	64	729	4096
Second Surfolids, - - - or Seventh Powers -		1	128	2187	16384
Biquadrates squared, - - or Eighth Powers -		1	256	6561	65536
Cubes cubed, - - - - or Ninth Powers -		1	512	19683	262144
Surfolids squared, - - - or Tenth Powers -		1	1024	59049	1048576
Third Surfolids, - - - or Eleventh Powers -		1	2048	177147	4194304
Square-Cubes squared, - or Twelfth Powers -		1	4096	531441	16777216
Fourth Surfolids, - - - or Thirteenth Powers		1	8192	1594323	67108864
Second Surfolids squared, or Fourteenth Powers		1	16384	4782969	268435456
Surfolids cubed, - - - - or Fifteenth Powers		1	32768	14348907	1073741824

Let this fold against

4	5	6	7	8	9
16	25	36	49	64	81
64	125	216	343	512	729
256	625	1296	2401	4096	6561
1024	3125	7776	16807	32768	59049
4096	15625	46656	117649	262144	531441
16384	78125	279936	823543	2097152	4782969
65536	390625	1679616	5764801	16777216	43046721
262144	1953125	10077696	40353607	134217728	387420439
1048576	9765625	60466176	282475249	1073741824	3486784401
4194304	48828125	362797056	1977326743	8589934592	31381059609
16777216	244140625	2176782336	13841287201	68719476736	28242953648
7108864	1220703125	13060694016	96889010407	549755813888	2541865828329
8435456	6103515625	78364164096	678223072849	4398046511104	22876792454961
73741824	30517578125	470184984576	4747561509943	35184372088832	205891132094649
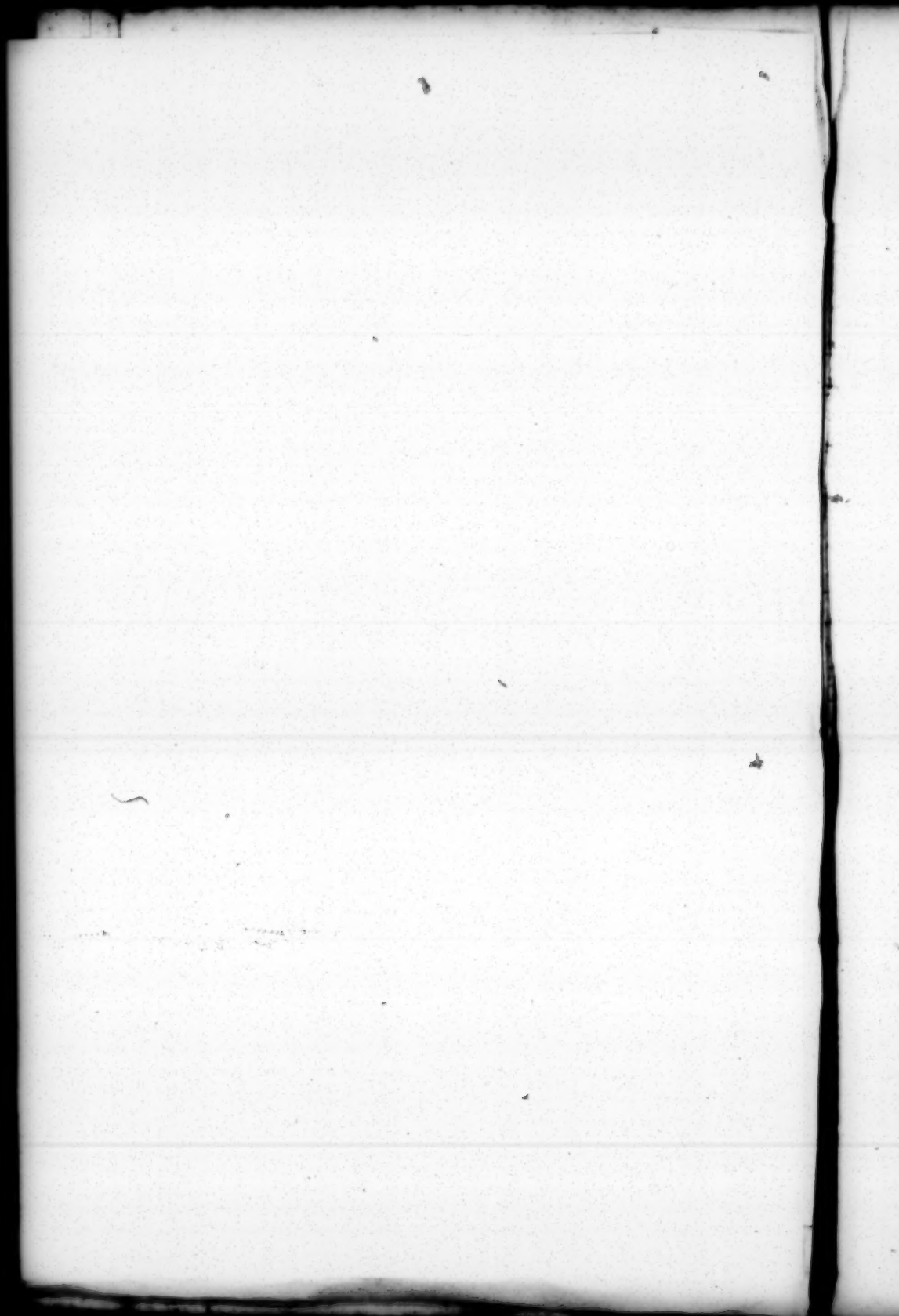
Of the SQUARE-ROOT.

Q. WHAT *is a* Square?

A. Any Number multiplied by itself produces a Square.

Q. *What is the* Extraction *of the* Square-Root?

A. If a *Square* be given to find one Side, it is called the *Extraction* of the *Square-Root.*

Q. *How is the given* Square *to be prepared for* Extraction?

A. By pointing off at every two Figures, from the *Units Place,* both ways for a *Resolvend.*

Q. *What is a* Surd?

A. It is an imperfect *Square,* or such a Number, whose Square-Root can never be exactly found.

EXAMPLES.

1. What is the Square of 17.1? — *Answ.* 292.41

2. What is the Square of .09? — *Answ.* .0081

3. What is the Square of .0094? *Answ.* .00008836

4. What is the Square-Root of 4712.81261? — — — — — } *Answ.* 68.649+

5. What is the Square-Root of 9712.718051? — — — — } *Answ.* 98.553+

6. What is the Square-Root of 3.1721812? — — — — — } *Answ.* 1.78106+

7. What is the Square-Root of 1.3976121? — — — — — } *Answ.* 1.1822+

8. What is the Square-Root of 761.801216? — — — — — } *Answ.* 27.6007+

9. What is the Square-Root of .0007612816? — — — — } *Answ.* .02759+

10. What is the Square-Root of 4 000067121? — — — — } *Answ.* 2.000016+

11. There is an Army consisting of a certain Number of Men, who are placed Rank and File, that is, in the Form of a Square, each Side having 472 Men; I demand how many Men the whole Square contains? *Answ.* 222784 *Men.*

12. The Floor of a certain great Room is made exactly Square, each Side of which contains 75 Feet; I demand how many Square Feet are contained therein? *Answ.* 5625 *Feet.*

13. Suppose 12544 Soldiers are to be put into Rank and File, in the Form of an equal Square; I demand how many Soldiers will be in the Front, and how many deep? *Answ.* 112.

14. A certain Square Pavement contains 197136 Square Stones, all of the same Size; I demand how many are contained in one of its Sides? *Answ.* 444.

15. The

15. The Wall of a Town is 17 Feet high, which is surrounded by a Mote of 20 Feet in breadth; I demand the length of a Ladder which shall reach from the Outside of the Mote to the Top of the Wall? *Answ.* 26.2+ *Feet.*

Of the SQUARE-ROOT of a VULGAR FRACTION.

Q. *How is the* Square-Root *of a* Vulgar Fraction *extracted?*

A 1. Reduce the *Fraction* to its lowest Term.

2. Extract the *Square-Root* of the Numerator for a new *Numerator,* and the *Square-Root* of the Denominator for a new *Denominator.*

3 If the *Fraction* be a *Surd,* reduce it to a *Decimal,* and then extract the *Square-Root* from it.

4. The *Decimal Fraction* must consist of an even Number of Places, as *two, four,* &c.

EXAMPLES.

1. What is the Square-Root of $\frac{1044}{6859}$? *Answ.* $\frac{2}{3}$.
2. What is the Square-Root of $\frac{1450}{7400}$? *Answ.* $\frac{4}{5}$.
3. What is the Square-Root of $\frac{7056}{9216}$? *Answ.* $\frac{7}{8}$.

SURDS.

4. What is the Square-Root of $\frac{1168}{6192}$? *Answ.* .71528+
5. What is the Square-Root of $\frac{208}{272}$? *Answ.* .87447+
6. What is the Square-Root of $\frac{387}{738}$? *Answ.* .72414+

Of the SQUARE-ROOT of a MIXT NUMBER.

Q. *How is the* Square-Root *of a* mixt Number *extracted?*

A 1. Reduce the *fractional* Part of the mixt Number to its lowest Term.

2. Reduce the *mixt Number* to an improper *Fraction.*

3. Extract the *Roots* of the Numerator and Denominator, for a new *Numerator* and *Denominator.*

4. If the mixt Number given, be a *Surd,* reduce the *fractional* Part to a *Decimal,* and annex it to the whole Number, and extract the *Square-Root* from the Whole.

EXAMPLES.

1. What is the Square-Root of $37\frac{16}{49}$? *Answ.* $6\frac{1}{7}$.
2. What is the Square-Root of $17\frac{16}{25}$? *Answ.* $4\frac{1}{5}$.
3. What is the Square-Root of $5\frac{288}{648}$? *Answ.* $2\frac{1}{3}$.

SURDS.

4. What is the Square-Root of $76\frac{14}{17}$? *Answ.* 8.7649+
5. What is the Square-Root of $7\frac{9}{15}$? *Answ.* 2.7961+

Of

Of the CUBE-ROOT.

Q. WHAT *is a* Cube?
A. Any Number multiplied by its *Square* produces a *Cube.*

Q. *What is the Extraction of the* Cube-Root ?
A. If a *Cube* be given to find out a Number, which being multiplied into its *Square,* produceth the Number given; this is called the Extraction of the *Cube-Root.*

Q. *How is the given* Cube *to be prepared for Extraction ?*
A. By pointing off at every three Figures, both Ways, from the *Units Place,* for a *Resolvend.*

Q. *What is a* Surd ?
A. It is an *imperfect Cube,* or such a Number, whose *Cube-Root* can never be exactly found.

Q. *What is the Rule for extracting the* Cube-Root *of a Number?*
A. This : The first Figure sought is the *Root* of the greatest *Cube* contained in the first Member, and it is called a ; then $3aa + 3a$ is the *Divisor,* which finds a new Figure called e ; then $3aae + 3eea + eee$ is the *Subtrahend* or Number to be subducted ; which *Operation* is to be continued to every *Resolvend.*

> Note, *This Rule being somewhat dark, I shall, by Way of Illustration, subjoin the Operation, at large, for extracting the* Cube-Root *of any Number.*

What is the Cube-Root of 444194.947 ?
(1) *Let the given* Number *be pointed as before directed;*

$$444194947$$

(2) *The first* Member, *which contains the greatest* Cube *is* 444; *and the nearest* Root, *whose* Cube *is not greater than it, is* 7, *which set*

$$\text{thus } 444194.947(7$$

(3) *The* Cube of 7 is 343, *which set down and subtract, annexing the next three Figures or Member,* viz. 194, *for a* Resolvend ;

$$\text{thus } 444194.947(7$$
$$343$$

$$\overline{101194} \text{ Resolvend}$$

(4) *The*

(4) *The Number* 7, *in the* Root, *is called* a; *then by the*
Rule, 3aa + 3a *is the* Divifor; *thus,*

$$
\begin{array}{r}
7 = a \\
7 = a \\
\hline
49 = aa \\
3 \\
\hline
147 = 3aa \\
21 = 3a \\
\hline
\end{array}
$$

Divifor 1491 = 3aa + 3a

$$
\begin{array}{r}
\quad\cdot\quad\cdot\quad\cdot \\
444194 \cdot 947 (7 \\
343 \\
\hline
1491) 101194 \; Refolvend
\end{array}
$$

(5) *The next Figure in the* Root, *viz.* 6 *(found by common*
Divifion) *is called* e; *then by the* Rule 3aae + 3eea + eee,
is the Subtrahend, *or Number to be fubducted; thus,*

$$
\begin{array}{r}
147 = 3aa \\
6 = e \\
\hline
882 = 3aae \\
756 = 3eea \\
216 = eee \\
\hline
\end{array}
$$

eee viz. 6 = 216

Sub. 95976 = 3aae + 3eea + eee

$$
\begin{array}{r}
6 = e \\
6 = e \\
\hline
36 = ee \\
3 \\
\hline
108 = 3ee \\
7 = a \\
\hline
756 = 3eea
\end{array}
$$

$$
\begin{array}{r}
\quad\cdot\quad\cdot\quad\cdot \\
444194 \cdot 947 (76. \\
343 \\
\hline
1491) 101194 \; Refolvend \\
95976 \; Subtrahend \\
\hline
5218 \; 947 \; Refolvend
\end{array}
$$

(6) *When the next* Member *is brought down, viz.* 947 *as*
before, both Figures *in the* Root, *viz.* 76 *muft be called* a; *then to*
find a Divifor to this laft Refolvend, *fay as before,* 3aa + 3a;
thus,

$$
\begin{array}{r}
76 = a \\
76 = a \\
\hline
456 \\
532 \\
\hline
5776 = aa \\
3 \\
\hline
17328 = 3aa \\
228 = 3a \\
\hline
\end{array}
$$

Divifor 173508 = 3aa + 3a

$$
\begin{array}{r}
76 = a \\
3 \\
\hline
228 = 3a
\end{array}
$$

$$
\begin{array}{r}
\quad\cdot\quad\cdot\quad\cdot \\
444194 \cdot 947 (76. \\
343 \\
\hline
1491) 101194 \; Refolvend \\
95976 \; Subtrahend \\
\hline
173508) 5218 \; 947 \; Refolvend
\end{array}
$$

(7) *The*

(7) *The next Figure in the* Root, *viz.* 3, *found as before, is also called* e; *then again* 3aae + 3eea + eee *is the other* Subtrahend, *or Number to be subducted; thus,*

$$17328 = 3aa$$
$$3 = e$$
$$\overline{51984} = 3aae$$
$$2052 = 3eea$$
$$27 = eee$$

Sub. $\overline{5218947} = 3aae + 3eea + eee$

eee viz. 3 = 27

$$3 = e$$
$$3 = e$$
$$\overline{9} = ee$$
$$3$$
$$\overline{27} = 3ee$$
$$76 = a$$
$$162$$
$$189$$
$$\overline{2052} = 3eea$$

$$444194.947(76.3 \ \textit{Answer}$$
$$343$$
$$1491)\overline{101194} \ \textit{Resolvend}$$
$$95976 \ \textit{Subtrahend}$$
$$173508)5218 \ 947 \ \textit{Resolvend}$$
$$5218 \ 947 \ \textit{Subtrahend}$$
$$0$$

EXAMPLES.

1. What is the Cube of 6.4 ? *Answ.* 262.144
2. What is the Cube of .13 ? *Answ.* .002197
3. What is the Cube of 41.1 ? *Answ.* 69426.531
4. What is the Cube of .09 ? *Answ.* .000729
5. What is the Cube of .007 ? *Answ.* .000000343
6. What is the Cube-Root of 7612.812161 ? - - - - } *Answ.* 19.67+
7. What is the Cube-Root of 7612181.7612 ? - - - } *Answ.* 196.71+
8. What is the Cube-Root of 61218.00121 ? - - - - } *Answ.* 39.41
9. What is the Cube Root of 7121.1021698 ? - - - - } *Answ.* 19.238+
10. What is the Cube-Root of 12000.812161 ? - - - - } *Answ.* 22.89+
11. What is the Cube-Root of .121861281 ? - - - - } *Answ.* .495+
12. What is the Cube-Root of .0069761218 ? - - - - } *Answ.* .19107+

13. If a cubical Piece of Timber be 41 Inches long, 41 Inches broad, and 41 Inches deep; how many cubical Inches doth it contain ? *Answ.* 68921 *cubical Inches.*

14. Suppose

14. Suppose a Cellar to be dug that shall be 12 Feet every way, in length, breadth, and depth; how many solid Feet of Earth must be taken out to compleat the same? *Answ.* 1728.

15. Suppose a Stone of a cubic Form to contain 474552 solid Inches; what is the superficial Content of one of its Sides? *Answ.* 6084 *Inches.*

Of *the* CUBE-ROOT *of a* VULGAR FRACTION.

Q. *How do you extract the* Cube-Root *of a Vulgar Fraction?*
A. 1. Reduce the *Fraction to its lowest Terms.*

2. Extract the *Cube-Roots* of the Numerator and Denominator for a new *Numerator* and *Denominator.*

3. If the *Fraction* be a *Surd,* reduce it to a *Decimal,* and then extract the *Cube-Root* from it.

4. The *Decimal Fraction* must consist of Ternaries of Places; as *three, six, nine,* &c.

EXAMPLES.

1. What is the Cube-Root of $\frac{352}{1188}$? *Answ.* $\frac{2}{3}$.
2. What is the Cube-Root of $\frac{1944}{4608}$? *Answ.* $\frac{3}{4}$.
3. What is the Cube-Root of $\frac{643}{3000}$? *Answ* $\frac{3}{5}$.

SURDS.

4. What is the Cube-Root of $\frac{4}{9}$? *Answ.* .763 +
5. What is the Cube Root of $\frac{6}{7}$? *Answ.* .949 +
6. What is the Cube-Root of $\frac{1}{3}$? *Answ.* .693 +

Of *the* CUBE-ROOT *of a* MIXT NUMBER.

Q. *How do you extract the* Cube-Root *of a* mixt Number?
A. 1. Reduce the *fractional* Part to its lowest Terms.

2. Reduce the *mixt Number* to an improper *Fraction.*

3. Extract the *Cube-Roots* of the Numerator and Denominator, for a new *Numerator* and *Denominator.*

4. If the mixt Number given be a *Surd,* reduce the fractional Part to a *Decimal,* and annex it to the whole Number, and extract the *Cube-Root* from the Whole.

EXAMPLES.

1. What is the Cube-Root of $57\frac{209}{327}$? *Answ.* $8\frac{1}{3}$.
2. What is the Cube-Root of $42\frac{21}{64}$? *Answ.* $3\frac{1}{2}$.
3. What is the Cube-Root of $5\frac{10}{125}$? *Answ.* $1\frac{4}{5}$.

SURDS.

4. What is the Cube-Root of $8\frac{2}{3}$? *Answ.* 2.013 +
5. What is the Cube-Root of $7\frac{1}{3}$? *Answ.* 1.966 +

Of

Of the BIQUADRATE-ROOT.

Q. WHAT *is a* Biquadrate *Number?*
A. Any Number involved *four Times* produces a *Biquadrate.*

Q. *How is the* Biquadrate-Root *extracted?*
A. Firft extract the *Square-Root* of the given *Refolvend;* and then extract the *Square Root* of that *Square-Root,* for the *Biquadrate-Root* required.

EXAMPLES.

1. What is the Biquadrate of 48 ? *Anfw.* 5308416.
2. What is the Biquadrate of 96 ? *Anfw.* 84934656.
3. What is the Biquadrate-Root of 5308416 ? *Anfw.* 48.
4. What is the Biquadrate-Root of 84934656 ? *Anfw.* 96.
5. What is the Biquadrate-Root } *Anfw.* 384.
of 21743279936 ?— — — — — }

Of the SURSOLID-ROOT.

Q. WHAT *is a* Surfolid?
A. Any Number involved *five Times,* produces a *Surfolid.*

Q. *How is the* Surfolid-Root, *or the* Root *of any other higher* Power *extracted.*

A. *By the following general Rules.*

1. If any even *Power* be given, let the *Square-Root* of it be extracted, which reduces it to half of the given Power, then the *Square-Root* of that Power reduces it to half of the fame Power; and fo on till you come to a *Square* or a *Cube.*

For *Example:* Suppofe a 24*th* Power be given; the *Square-Root* of that reduces it to a 12*th* Power; the *Square-Root* of the 12*th* Power reduces it to a 6*th* Power; and the *Square-Root* of the 6*th* Power to a *Cube.*

2. If any odd *Power* be given, as the 17*th*, &c. obferve,

(1) From the *Unity Place,* both ways, point off at every fuch Number of Figures as is the *Index* of the Power for a *Refolvend.*

(2) Seek in the Table of *Powers,* for fuch a Power (being the fame Power with the *Index)* as comes neareft the firft *Period,* whether greater or lefs, calling its *Root* accordingly *more than juft,* or *lefs than juft.*

(3) Annex fo many *Cyphers* to the *Root,* as there are *Periods* of whole Numbers in the given *Refolvend.*

(4) Find the *Difference* between the given *Refolvend,* and the *Power* coming neareft the firft *Period.*

(5) What

(5) Whatever odd *Power* is given, the next lowest odd *Power* to that of the said *Root* must be found, with its annexed *Cyphers* : *i. e.* if the 9th Power be given, find the 7th *Power* of the *Root* and *Cyphers*; if the 11th *Power* be given, find the 9th, *&c.*

(6) Multiply that next lowest odd *Power* by the *Index* of the given *Power*, and let that Product be a *Divisor* to the *Difference* between the given *Resolvend* and *Power* first found, which depresses it to a *Square.*

(7) Point this *Square* into *Periods* of two Figures each.

(8) Then make the first *Root* without its *Cyphers* a *Divisor*, and ask how oft it may be found in the first *Period* of the *Square.*

(9) If the *Divisor* be *less than just*, you must multiply the *Quotient Figure* by half the *Index*, i. e. if the *Index* be 11, multiply the *Quotient Figure* by 5 ; if the *Index* be 9, multiply it by 4, *&c.* and add it to the *Divisor* ; but if it be *more than just*, you must subtract it from the *Divisor*, having a *Cypher* annexed or supposed to be annexed to the *Divisor* ; which *Sum* or *Difference* must be multiplied by the said *Quotient Figure*, and so continued to every new Figure in the *Quotient.*

(10) If the first *Root* with its *Cyphers* be *more than just*, the *Quotient* must be subtracted from it ; but if it be *less than just*, it must be added to it; and the *Sum* or *Difference* will be the *Root* required.

3. If an even *Power* be given, and the *Square-Root* of that *Power* being extracted, reduces it to an odd *Power* : you must then proceed with that odd *Power* as the foregoing *Rule* directs.

EXAMPLES.

1. What is the Surfolid of 6436343. ?

$$6436343$$

$$32 \text{ } the \text{ } nearest \text{ Surfolid, } whose \text{ Root } and \text{ Cypher } is \text{ 20}$$

$$3236343$$

The Cube *of* 20 *is* = 8000

And 8000 × 5 *is* = 40000

Then 40000)3236343(80   *Lastly* 20

Again 2)80(3   + 3

+ 3 × 2 = 6 78   ─────

1st.*Divisor*=26 ─   23 *the* Surfolid-
                                          Root required.
        2 *to be rejected.*

Note, *This is a very expeditious Way of extracting the Roots of high Powers, but it is not always exact, because (as Mr. Ward observes, for it was taken from him) there will be a Remainder, and sometimes an Excess or Defect in the last Figure of the Root, when the given Resolvend or Power hath a true Root ; as appears by the fifth Example following, whose true Root should not be 384.3 as it there stands, but 384.*

2. What

2. What is the Surfolid of 48 ?   *Answ.* 254803968.
3. What is the Surfolid-Root of 8153726976 ?   *Answ.* 96.
4. What is the Surfolid-Root of 254803968. ?   *Answ.* 48.
5. What is the Surfolid-Root of } *Answ.* 384.3
8349416423424. ?   — — — — }

Of *the* SQUARE-CUBE-ROOT.

Q. WHAT *is a* Square-Cube ?
A. Any Number involved *fix Times*, produces a *Square-Cube*.

EXAMPLES.

1. What is the Square-Cube of } *Answ.* 12230590464.
48. ? — — — — — — — — — }
2. What is the Square-Cube-Root } *Answ.* 96.
of 782757789696. ?— — — — }
3. What is the Square Cube-Root } *Answ.* 48.
of 12230590464. ? — — — — }
4. What is the Square-Cube-Root } *Answ.* 384.
of 3206175906594816. ? — — }

Of *the* SECOND SURSOLID-ROOT.

Q. WHAT *is the* Second Surfolid ?
A. Any Number involved *feven Times* produces a *Second Surfolid*.

EXAMPLES.

1. What is the fecond Sur- } *Answ.* 75144747810816.
folid of 96. ? — — — — }
2. What is the fecond Surfolid-Root of } *Answ.* 96.
75144747810816. ? — — — — — }
3. What is the fecond Surfolid-Root of } *Answ.* 48.
587068342272. ?— — — — — — }
4. What is the fecond Surfolid-Root of } *Answ.* 384.42.
123117548132409344. ? — — — }

Of *the* SQUARE-BIQUADRATE-ROOT.

Q. WHAT *is a* Square-Biquadrate ?
A. Any Number involved *eight Times*, is a *Bi-quadrate Squared*, or *Square-Biquadrate*.

EXAMPLES.

1. What is the Squared } *Answ.* 28179280429056
Biquadrate of 48. ? — — }

2. What

2. What is the Square-Biquadrate-Root } Answ. 96.
of 72138957898383336. ? - - - - - }

3. What is the Square-Biquadrate-Root } Answ. 48.
of 281792804290596. ? - - - - - }

4. What is the Square-Biquadrate-Root } Answ. 384.
of 4727698744828451880096. ?- - - }

Of the CUBED CUBE-ROOT.

Q. **W**HAT *is* a Cubed Cube?
A. Any Number involved *nine Times*, is a *Cubed Cube.*

EXAMPLES.

1. What is the Cubed Cube-Root of } Answ. 96.2
692533995824480256. ?- - - - - }

2. What is the Cubed Cube-Root of } Answ. 48.09
1352605460594688. ? - - - - - }

3. What is the Cubed Cube-Root of } Answ. 384.5
181543631801412552228864 ? - - }

Of the SQUARE - SURSOLID-ROOT.

Q. **W**HAT *is* a Squared Surfolid?
A. Any Number involved *ten Times*, produces a quared Surfolid?

EXAMPLES.

1. What is the Squared Surfolid-Root of } Answ. 48.
64925062108545024. ? - - - - - }

2. What is the Squared Surfolid-Root of } Answ. 96.
66483263599150104576. ?- - - - }

3. What is the Squared Surfolid-Root of } Answ. 384.3
69712754611742420055883776. ?- - }

Of the THIRD SURSOLID-ROOT.

Q. **W**HAT *is a* Third Surfolid?
A. Any Number involved *eleven Times* produces a *third Surfolid.*

EXAMPLES.

1. What is the third Surfolid-Root of } Answ. 23.
952809757913927. ? - - - - - }

2. What is the third Surfolid-Root of } Answ. 48.
3116402981210161152. ? - - - - }

3. What is the third Surfolid-Root of } Answ. 96.
6382393305518410039296. ? - - - }

Of

Of *the* SQUARED SQUARE-CUBE-ROOT.

Q. WHAT *is a* Squared Square-Cube?
A. Any Number involved *twelve Times* produces
a *Squared Square-Cube.*

EXAMPLES.

1. What is the Root of this Squared Square-Cube 14958734309808773 5296.? – – – } *Answ.* 48.

2. What is the Root of this Squared Square-Cube 61270975732976736377 2416.? – – – } *Answ.* 96.

3. What is the Root of this Squared Square-Cube 10279563944 29090291760398073856.? } *Answ.* 384.

A general Rule *for extracting the* ROOTS *of all* Powers.

1. PRepare the given Number for *Extraction*, by pointing off from the *Unity Place*, as the *Root* required directs.

2. Find the first Figure in the *Root* by your own Judgment, or by Inspection into the *Table* of *Powers.*

3. Subtract it from the *given Number.*

4. Augment the *Remainder* by the next Figure in the *given* Number, that is, by the first Figure in the next Point, and call this your *Dividend.*

5. Involve the *whole Root*, last found, into the next inferior *Power* to that which is given.

6. Multiply it by the *Index* of the *given Power*, and call this your *Divisor.*

7. Find a Quotient Figure by common Division, and annex it to the Root.

8. Involve all the *Root*, thus found, into the given *Power.*

9. Subtract this *Power* (always) from as many Points of the given *Power* as you have brought down, beginning at the lowest Place.

10. To the *Remainder* bring down the first Figure of the next Point for a new *Dividend.*

11. Find a new *Divisor* as before, and in like manner proceed till the Work is ended.

EXAM-

EXAMPLES.

What is the Cube-Root of 115501303. ?

$$115501303.(487$$
$$64$$

48)515 *Dividend*

110592 *Subtrahend*

6912)49093 *Dividend*

115501303 *Subtrahend*

0

$$4 \times 4 \times 3 = 48 \; Divifor$$
$$48 \times 48 \times 48 = 110592 \; Subtrahend$$
$$48 \times 48 \times 3 = 6912 \; Divifor$$
$$487 \times 487 \times 487 = 115501303 \; Subtrahend$$

2. What is the Biquadrate-Root of 56249134561. ?

$$56249134561.(487$$
$$256$$

256)3064 *Dividend*

5308416 *Subtrahend*

442368) 3164974 *Dividend*

56249134561 *Subtrahend*

0

$$4 \times 4 \times 4 \times 4 = 256 \; Divifor$$
$$48 \times 48 \times 48 \times 48 = 5308416 \; Subtrahend$$
$$48 \times 48 \times 48 \times 4 = 442368 \; Divifor$$
$$487 \times 487 \times 487 \times 487 = 56249134561 \; Subtrahend$$

Note, This General Rule I receiv'd from my worthy Friend William Mountaine, Efq; F. R. S. and Teacher of the Mathematics at Shad-Thames.

Of

Of SIMPLE INTEREST.

Q. **W**HAT *particular* Letters *are used here?*
    A. These ; *P,* any *Principal.*
            T, the *Time.*
            R, the *Ratio* of the Rate *per Cent.*
            A, the *Amount.*

Q. What is the Ratio ?
A. It fignifies only the *Simple Intereft* of 1 *l.* for one Year,
at any propofed Rate of Intereft *per Cent.* and is thus found ;

        l.   *l.*   *l.*
    100 : 6 :: 1 : 0. 06
    100 : 5 :: 1 : 0. 05, *&c.*

A TABLE *of* RATIOS.

Rate per Ct.	Ratio.	Rate per Ct.	Ratio.
2	.02	$6\frac{1}{2}$	.065
3	.03	7	.07
$3\frac{1}{2}$	.035	$7\frac{1}{2}$	.075
4	.04	8	.08
$4\frac{1}{2}$	.045	$8\frac{1}{2}$	.085
5	.05	9	.09
$5\frac{1}{2}$	.055	$9\frac{1}{2}$	.095
6	.06	10	.1

CASE I.

Q. When P, T, *and* R, *are given to find* A ; *how is it difcovered?*
A. Thus, *ptr* + *p* = *a.*
Note, *Any Quantity of* Letters *put together like a Word, denote continual
Multiplication.*

EXAMPLES.

1. What Sum will 567 *l.* 10 *s.* amount to in 9 Years, at
6 *per Cent. per Ann.? Anfw.* 873 *l.* 19 *s.*
   2. What will 508 *l.* 14 *s.* amount to in 1 Year, at 5 *per
Cent. per Ann? Anfw.* 534 *l.* 2 *s.* 8 *d.* 1.6 *qr.*
   3. What will 600 *l.* 14 *s.* amount to in 10 Years, at $4\frac{1}{2}$ *per
Cent. per Ann.? Anfw.* 871 *l.* 0 *s.* 3 *d* 2.4 *qrs.*
   4. What will 4000 *l.* amount to in 5 Years, at $3\frac{1}{2}$ *per Cent.
per Ann.? Anfw.* 4700 *l.*

Note, *When the* Time given, *does not confift of whole* Years, *then reduce the
odd* Time *into Decimal Parts of a* Year. *And, unlefs fuch Parts of a* Year
chance to be juft $\frac{1}{4}$, $\frac{1}{2}$, *or* $\frac{3}{4}$ *of a* Year, *the beft way will be to reduce the
odd* Times *into Days, and then work with the Decimal Parts of a* Year,
that are equivalent to thofe Days.

A TABLE

A TABLE *for the ready finding the Decimal Parts of a* Year *equal to any Number of* Days, *or Quarters of a* Year.

Days.	Decimal Pts.	Days.	Decimal Pts.	Days.	Decimal Pts.
1	.00274	10	.027397	100	.273973
2	.005479	20	.054794	200	.547945
3	.008219	30	.082192	300	.821918
4	.010959	40	.109589	365	1.000000
5	.013699	50	.136986		
6	.016438	60	.164383		
7	.019178	70	.191781	$\frac{1}{4}$ *of a Year* .25
8	.021918	80	.219178	$\frac{1}{2}$ *of a Year* .5
9	.024657	90	.246575	$\frac{3}{4}$ *of a Year* .75

Note, *When the true Number of Days cannot be found at one View in this Table, then both them and their Decimals must be taken out of the Table at twice or thrice, as their Number requires, and added together. So the Decimal Parts of a Year =* 236 *Days are thus found.*

$$200 = .547945$$
$$30 = .082192$$
$$6 = .016438$$
$$236 = .646575$$

EXAMPLES.

5. What will 7200 *l.* amount to in $6\frac{1}{2}$ Years, at 5 *per Cent. per Ann. ? Answ.* 9540 *l.*

6. What will 1110 *l.* 18 *s.* amount to in $12\frac{1}{4}$ Years at 5 *per Cent. per Annum ? Answ.* 1819 *l.* 1 *s.* 11 *d.* 2.8 *qrs.*

7. What will 280 *l.* 10 *s.* amount to in 3 Years and 148 Days at 5 *per Cent. per Ann. ? Answ.* 328 *l.* 5 *s.* 2 *d.* 3.38 + *qrs.*

8. What will 196 *l.* amount to in 189 Days at 4 *per Cent. per Ann. ? Answ.* 200 *l.* 1 *s.* 2 *d.* 1.23 + *qrs.*

CASE 2.

Q. *When* A, T, *and* R, *are given to find* P ; *how is it discovered ?*

A. Thus ; $\dfrac{a}{tr + 1} = p.$

EXAMPLES.

1. I demand what Principal will amount to 873 *l.* 19 *s.* in 9 Years at 6 *per Cent. per Ann. ? Answ.* 567 *l.* 10 *s.*

2. I demand what Principal will amount to 534 *l.* 2 *s.* 8 *d.* 1.6 *qr.* in 1 Year at 5 *per Cent. per Ann. ? Answ.* 508 *l.* 14 *s.*

3. I demand what Principal will amount to 9540 *l.* in $6\frac{1}{2}$ Years at 5 *per Cent. per Ann. ? Answ.* 7200 *l.*

4. I demand what Principal will amount to 1819 *l.* 1 *s.* 11 *d.* 2.8 *qrs.* in $12\frac{1}{4}$ Years at 5 *per Cent. per Ann. ? Answ.* 1110 *l.* 18 *s.*

5. I

5. I demand what Principal will amount to 871 *l.* 0 *s.* 3 *d.* 2.4 *qrs.* in 10 Years at $4\frac{1}{2}$ *per Cent. per Ann.? Answ.* 600 *l.* 14 *s.*

6. I demand what Principal will amount to 4700 *l.* in 5 Years at $3\frac{1}{2}$ *per Cent. per Ann.? Answ.* 4000 *l.*

7. I demand what Principal will amount to 328 *l.* 5 *s.* 2 *d.* 3.38 *qrs.* in 3 Years and 148 Days, at 5 *per Cent? Answ.* 280 *l.* 10 *s.*

8. What Principal being put to Interest for 189 Days at 4 *per Cent.* will amount to 200 *l.* 1 *s.* 2 *d.* $\frac{1}{2}$? *Answ.* 196 *l.*

C A S E 3.

Q. When A, P, *and* T, *are given to find* R ; *how is it discovered?*

A. Thus; $\dfrac{a-p}{tp} = r.$

E X A M P L E S.

1. At what Rate *per Cent.* will 567 *l.* 10 *s.* amount to 873 *l.* 19 *s.* in 9 Years ? *Answ.* 6 *l. per Cent.*

2. At what Rate *per Cent.* will 508 *l.* 14 *s.* amount to 534 *l.* 2 *s.* 8 *d.* 1.6 *qrs.* in 1 Year ? *Answ.* 5 *l. per Cent.*

3. At what Rate *per Cent.* will 7200 *l.* amount to 9540 *l.* in $6\frac{1}{2}$ Years ? *Answ.* 5 *l. per Cent.*

4. At what Rate *per Cent.* will 1110 *l.* 18 *s.* amount to 1819 *l.* 1 *s.* 11 *d.* 2.8 *qrs.* in $12\frac{1}{4}$ Years ? *Answ.* 5 *l. per Cent.*

5. At what Rate *per Cent.* will 600 *l.* 14 *s* amount to 871 *l.* 0 *s.* 3 *d.* 2.4 *qrs* in 10 Years ? *Answ.* $4\frac{1}{2}$ *per Cent.*

6. At what Rate *per Cent.* will 4000 *l.* amount to 4700 *l.* in 5 Years ? *Answ.* $3\frac{1}{2}$ *per Cent.*

7. At what Rate *per Cent.* will 280 *l.* 10 *s.* amount to 328 *l.* 5 *s.* 2 *d.* 3.38 *qrs.* in 3 Years and 148 Days ? *Answ* 5 *l. per Cent.*

8. At what Rate *per Cent.* will 196 *l.* amount to 200 *l.* 1 *s.* 2 *d.* $\frac{1}{2}$ in 189 Days ? *Answ.* 4 *per Cent.*

C A S E 4.

Q. When A, P, *and* R, *are given to find* T ; *how is it discovered?*

A. Thus; $\dfrac{a-p}{rp} = t.$

E X A M P L E S.

1. In what Time will 567 *l.* 10 *s.* amount to 873 *l.* 19 *s.* at 6 *per Cent.? Answ.* 9 *Years.*

2. In what Time will 508 *l.* 14 *s.* amount to 534 *l.* 2 *s.* 8 *d.* 1.6 *qr.* at 5 *per Cent.? Answ.* 1 *Year.*

3. In what Time will 7200 *l.* amount to 9540 *l.* at 5 *per Cent. Answ.* $6\frac{1}{2}$ *Years.*

H

4. In

4. In what Time will 1110*l.* 18*s.* amount to 1819*l.* 1*s.* 11*d.* 2.8 *qrs.* at 5 *per Cent.* ? *Anfw.* 12¾ *Years.*

5. In what Time will 600*l.* 14*s.* amount to 871*l.* 0*s.* 3*d.* 2.4 *qrs.* at 4½ *per Cent.* ? *Anfw.* 10 *Years.*

6. In what Time will 4000*l.* amount to 4700*l.* at 3½ *per Cent.* ? *Anfw.* 5 *Years.*

7. In what Time will 280*l.* 10*s.* amount to 328*l.* 5*s.* 2*d.* 3.38 *qrs.* at 5 *per Cent.* ? *Anfw.* 3 *Years and* 148 *Days.*

8. In what Time will 196*l.* amount to 200*l.* 1*s.* 2*d.* ½ at 4 *per Cent.* *Anfw.* 189 *Days.*

Of ANNUITIES *or* PENSIONS *in* ARREARS.

Q. *What is meant by* Annuities *or* Penfions *in* Arrears ?

A. Annuities *or* Penfions *are* faid to be in *Arrears,* when they are payable, either Yearly, half Yearly, or Quarterly, and are unpaid for any Number of Payments.

Note, U *reprefents the* Annuity, Penfion, &c. R, T *and* A *as before.*

CASE I.

Q. *When* U, R, *and* T, *are given to find* A, *how is it difcovered?*

A. Thus ; $\frac{tut - tu}{2} \times r : + tu = a.$

EXAMPLES.

1. If an Annuity of 70*l.* be forborn 5 Years, what will it amount to in that Time, at 5 *per Cent.* ? *Anfw.* 385 *l.*

2. If the Payment of a Penfion be omitted for 7 Years ; what will be the Amount in that Time at 6*l. per Cent.* when the Penfion is 56*l. per Ann.* ? *Anfw.* 462*l.* 11*s.* 2*d.* 1.6 *qr.*

3. An Houfe is lett upon Leafe for 7 Years, at 50*l. per Ann.* I demand the Amount for that Time at 4*l. per Cent.* for the Forbearance of Payment? *Anfw.* 392 *l.*

4. Suppofe a Salary of 100*l. per Ann.* be forborn 7 Years, what is the Amount at 4½ *per Cent.* ? *Anfw.* 794 *l.* 10*s.*

Note, *When the Annuities or Rents are to be paid by half-yearly or quarterly Payments, as moft generally they are, then*

For half-yearly Payments, *take (always) half of the Ratio, half of the yearly Rent, and twice the Number of Years ; that is, reduce the Years into half-years, for R, U, and T ; But,*

For quarterly Payments, *take a fourth Part of the Ratio, a fourth Part of the yearly Rent, and four times the Number of Years ; that is reduce the Years into Quarters, and work as before.*

5. If 70*l.* Annuity payable every half Year, were unpaid 5 Years : what will it amount to in that Time at 5 *per Cent.* ? *Anfw.* 389*l.* 7*s.* 6*d.*

6. If

6. If 70 *l.* Annuity payable every Quarter, were unpaid 5 Years; what will it amount to in that Time at 5 *per Cent.* ? *Answ.* 391 *l.* 11 *s.* 3 *d.*

> Note, *By comparing these two* Examples *with the first, it may be observed that the* Amount *of half-yearly* Payments *is more advantageous than yearly* Payments; *and quarterly, than half-yearly* Payments.

C A S E 2.

Q. *When* A, R, *and* T, *are given to find* U; *how is it discovered?*

A. Thus; $\dfrac{2a}{trt - tr + 2t} = u$

E X A M P L E S

1. If the Amount of an Annuity for 5 Years at 5 *per Cent.* be 385 *l.* what is the Annuity ? *Answ.* 70 *l.*

2. If the Amount of a Pension be 462 *l.* 11 *s.* 2 *d.* 1.6 *qr.* the Time be 7 Years, and the Rate *per Cent.* 6 *l.* what is the Pension? *Answ.* 56 *l.*

3. If an House be lett upon Lease for 7 Years, and the Amount for that Time be 392 *l.* at 4 *per Cent.* what is the yearly Rent? *Answ.* 50 *l.*

4. If a Salary amounts to 794 *l.* 10 *s.* in 7 Years, at 4½ *per Cent.* what is the Salary ? *Answ.* 100 *l. per Ann.*

> Note, *When the* Payments *are half-yearly,* 4a *must be divided; but when they are quarterly, then* 8a *must be divided as before.*

5. If the Amount of an Annuity, payable half yearly, for 5 *Yrs.* at 5 *per Cent.* be 389 *l.* 7 *s.* 6 *d.* what is the Annuity ? *Answ.* 70 *l.*

6. If the Amount of an Annuity, payable quarterly for 5 *Yrs.* at 5 *per Cent.* be 391 *l.* 11 *s.* 3 *d.* what is the Annuity ? *Answ.* 70 *l.*

C A S E 3.

Q. *When* U, A, *and* T, *are given to find* R; *how is it discovered?*

A. Thus; $\dfrac{2a - 2ut}{utt - ut} = r.$

E X A M P L E S.

1. If an Annuity of 70 *l. per Ann.* amounts to 385 *l.* in 5 Years; I demand the Rate *per Cent.* ? *Answ.* 5 *l.*

2. If a Pension of 56 *l. per Ann.* amounts to 462 *l.* 11 *s.* 2 *d.* 1.6 *qr.* in 7 Years; what is the Rate *per Cent.* ? *Answ.* 6 *l.*

3. If an House be lett upon Lease for 7 Years, at 50 *l. per Ann.* and the Amount for that Time be 392 *l.* what is the Rate *per Cent.*? *Answ.* 4 *l. per Cent.*

4. If a Salary of 100 *l. per Ann.* being forborn 7 Years amounts to 794 *l.* 10 *s.* I demand the Rate *per Cent.* ? *Answ.* 4½.

> Note, *When the* Payments *are half-yearly, then* 4a—4ut *must be divided; but when they are quarterly, then* 8a—8ut *must be divided as before.*

5. If an Annuity of 70*l. per Ann.* payable half-yearly, being forborn 5 Years, amounts to 389*l.* 7*s.* 6*a.* I demand the Rate *per Cent.* ? *Answ.* 5*l. per Cent.*

6. If an Annuity of 70*l. per Ann.* payable quarterly, amounts to 391*l.* 11*s.* 3*d.* in 5 Years; I demand the Rate *per Cent.* ? *Answ.* 5*l. per Cent.*

C A S E 4.

Q. *When* U, A, *and* R, *are given to find* T; *how is it discovered* ?

A. Thus; First $\dfrac{z}{r} - 1 = x$.

Secondly, $\sqrt{\dfrac{2a}{ru} + \dfrac{xx}{4}} : -\tfrac{1}{2}x = t$.

E X A M P L E S.

1. In what Time will 70*l. per Ann.* amount to 385*l.* forborn at 5 *per Cent.* ? *Answ.* 5 *Years.*

2. In what Time will a Pension of 56*l. per Ann.* amount to 462*l.* 11*s.* 2*d* 1.6*qr.* at 6 *per Cent.* ? *Answ.* 7 *Years.*

3. If an House be lett upon Lease, for a certain Time, for 50*l. per Ann.* and the Amount be 392*l.* at 4 *per Cent.* I demand the Time that it was lett for ? *Answ.* 7 *Years.*

4. If a Salary of 100*l. per Ann.* being forborn a certain Time, amount to 794*l.* 10*s.* at 4½ *per Cent.* I demand the Time of Forbearance ? *Answ.* 7 *Years.*

Note, *If the Payments were half-yearly, then* T *will be equal to the Number of* Half-years, *or* Payments; *but if they were to be made* Quarterly, *then* T *will be equal the Number of* Quarterly Payments.

5. If an Annuity of 70*l. per Ann.* payable half-yearly, being forborn, amounts to 389*l.* 7*s.* 6*d.* at 5 *per Cent.* I demand the Time and Payments forborn ? *Answ.* 10 *Payments* = 5 *Years.*

6. If an Annuity of 70*l. per Ann.* payable quarterly, being forborn, amounts to 391*l.* 11*s.* 3*d.* at 5 *per Cent.* I demand the Time and Payments forborn ? *Answ.* 20 *Payments* = 5 *Years.*

Of *the* PRESENT WORTH *of* ANNUITIES *or* PENSIONS, &c.

Note, P *represents the* present Worth; U, T, *and* R, *as in the last.*

C A S E I.

Q. *When* U, T, *and* R, *are given to find* P; *how is it discovered* ?

A. Thus; $\dfrac{rtt - rt + 2t}{2t + 2} : \times u = p.$

EXAMPLES.

1. What is the prefent Worth of 50*l. per Ann.* to continue 6 Years, at 5 *per Cent.?* *Anfw.* 259*l.* 12*s.* 3*d.* 2 4+*qrs.*

2. What is 80*l.* yearly Rent, to continue 5 Years, worth in ready Mony, at 6 *per Cent.?* *Anfw.* 344*l.* 12*s.* 3*d* 2.5+*qrs.*

3. What is a Salary of 40 *l. per Ann.* to continue 7 Years, worth in ready Mony at 4 *per Cent.?* *Anfw.* 245*l.*

4. What is a Penfion of 30*l. per Ann.* for 5 Years, worth in ready Mony, at 4½ *per Cent.?* *Anfw.* 133*l.* 9*s.* 4*d.* 2.6+*qrs.*

Note, *Obferve the fame* Note *bere, which is given in Cafe* 1, *in Annuities and Penfions in Arrears, concerning* half-yearly *and* quarterly Payments.

5. What is the prefent Worth of 50*l. per Ann.* payable half-yearly for 6 Years, at 5 *per Cent.?* *Anfw.* 262*l.* 10*s.*

6 What is the prefent Worth of 50*l. per Ann* payable quarterly for 6 Years, at 5 *per Cent.?* *Anfw.* 263*l.* 18*s.* 9*d.* 3 6*qrs.*

Note, *By comparing thefe two* Examples *with the firft, it may be obferved that the* prefent Worth *of* half-yearly Payments, *is more advantageous than* yearly Payments, *and the* prefent Worth *of* quarterly *than* half-yearly Payments.

CASE 2.

Q. *When* P, T, *and* R, *are given to find* U; *how is it difcovered?*

A. Thus; $\dfrac{rt+1}{rtt-rt+2t}$: × 2p = u.

EXAMPLES.

1. There is a Leafe of an Houfe 6 Years to come; I demand the yearly Rent, when the prefent Worth at 5 *per Cent.* is 259*l.* 12*s.* 3*d.* 2*qrs.?* *Anfw.* 50*l. per Ann.*

2. What yearly Rent is that, the prefent Worth of which for 5 Years is 344*l.* 12*s.* 3*d.* 2*qrs.* at 6 *per Cent.?* *Anfw.* 80*l. per Ann.*

3. What Salary is that, which for 7 Years Continuance at 4 *per Cent.* produces 245*l.* for the prefent Worth? *Anfw.* 40*l. per Ann.*

4. If the prefent Worth of a Penfion to continue 5 Years at 4½ *per Cent.* be 133*l.* 9*s.* 4*d.* 3*qrs.* I demand the Penfion? *Anfw.* 30*l.*

Note, *When the* Payments *to be made, are* half-yearly, *you muft multiply by* 4p; *but when they are* quarterly, *then multiply by* 8p *to find* u.

5. There is a Leafe of an Houfe, payable half-yearly, for 6 Years to come; I demand the yearly Rent, when the prefent Worth at 5 *per Cent.* is 262*l.* 10*s.?* *Anfw.* 50*l.*

6. There is a Leafe of an Houfe, payable quarterly, for 6 Years to come; I demand the yearly Rent, when the prefent Worth at 5 *per Cent.* is 263*l.* 18*s.* 9*d.* 3.6*qrs.?* *Anfw.* 50*l.*

CASE 3.

Q. *When* U, P, *and* T, *are given to find* R ; *how is it discovered?*

A. Thus ; $\dfrac{2ut - 2p}{2p - \overline{utt} - ut} = r.$

EXAMPLES.

1. I demand at what Rate *per Cent.* will the yearly Rent of 50 *l.* to continue 6 Years, produce the present Worth of 259 *l.* 12 *s.* 3 *d.* 2 *qrs.* ? *Answ.* 5 *l. per Cent.*

2. If the yearly Rent of 80 *l. per Ann.* to continue 5 Years, bring 344 *l.* 12 *s.* 3 *d.* 2 *qrs.* present Worth ; what is the Rate *per Cent.* ? *Answ.* 6 *l. per Cent.*

3. If a Salary of 40 *l. per Ann.* to continue 7 Years, produce 245 *l.* for the present Worth ; what is the Rate *per Cent.* ? *Answ.* 4 *l. per Cent.*

4. If a Pension of 30 *l. per Ann.* to continue 5 Years, produce 133 *l.* 9 *s.* 4 *d.* 2 *qrs.* for the present Worth ; what is the Rate *per Cent. Answ.* 4½ *l. per Cent.*

> Note, *When the Annuities, or Rents, are to be paid half-yearly or quarterly, then*
> For *half-yearly Payments, take* half *of the Annuity or yearly Rent, and* twice *the Number of Years, that is, reduce the Years into* half Years, *and then the* Quotient *of the upper Part divided by the lower, will be the* Ratio, *of half the Rate per Cent. But*
> For *quarterly-Payments, take a* fourth Part *of the Annuity or yearly Rent, and* four Times *the Number of Years ; that is, reduce the Years into* Quarters ; *and then the* Quotient *of the upper Part divided by the lower, will be the* Ratio *of a fourth Part of the Rate per Cent.*

5. A Lease of an House of 50 *l. per Ann.* payable half-yearly, having 6 Years to come, is sold for 262 *l.* 10 *s.* I demand the Rate *per Cent.* ? *Answ.* 5 *l. per Cent.*

6. A Lease of an House of 50 *l. per Ann.* payable quarterly, having 6 Years to come, is sold for 263 *l.* 18 *s.* 9 *d.* 3 *qrs.* I demand the Rate *per Cent. Answ.* 5 *l. per Cent.*

CASE 4.

Q. *When* U, P, *and* R, *are given to find* T ; *how is it discovered?*

A. Thus ; First, $\dfrac{2}{r} - \dfrac{2p}{u} - 1 = x.$

Secondly, $\sqrt{\dfrac{2p}{ru} + \dfrac{xx}{4}} : - \dfrac{x}{2} = t.$

EXAM-

EXAMPLES.

1. If 50 *l.* yearly Rent, produce the prefent Worth of 259 *l.* 12 *s.* 3 *d.* 2 *qrs.* at 5 *per Cent.* what is the Time of its Continuance ? *Answ.* 6 *Years.*

2. I demand how long 80 *l. per Ann.* may be purchafed for 344 *l.* 12 *s.* 3 *d.* 2 *qrs.* at 6 *per Cent. Answ.* 5 *Years.*

3. How long muft a Salary of 40 *l. per Ann.* be enjoyed for 245 *l.* at 4 *per Cent. ? Answ.* 7 *Years.*

4. What Time may a Penfion of 30 *l. per Ann.* be bought for 133 *l.* 9 *s.* 4 *d.* 2 *qrs.* at 4½ *per Cent. ? Answ.* 5 *Years.*

> *Note* 1. *If the Payments are to be half-yearly, then* U *will be* = *half of the given* Leafe, Penfion, &c. *and* R *will be* = *half of the Ratio of the given* Rate ; *and* T *which is required, will be* = *the Number of* Payments *or* half Years.
>
> 2. *If the Payments are to be quarterly, then* U *will be* = *a fourth Part of the given* Leafe, Penfions, &c. *and* R *will be* = *a fourth Part of the* Ratio *of the given* Rate ; *and* T *will be the Number of quarterly-* Payments.

5. A Leafe of an Houfe of 50 *l. per Ann.* payable half yearly, is fold for 262 *l.* 10 *s.* at 5 *per Cent.* I demand the Number of Payments, and the Time to come ? *Answ.* 12 *Payments* = 6 *Yrs.*

6. A Leafe of an Houfe of 50 *l. per Ann.* payable quarterly, is fold for 263 *l.* 18 *s.* 9 *d.* 3 *qrs.* at 5 *per Cent.* I demand the Number of Payments, and the Time to come ? *Answ.* 24 *Payments* = 6 *Years.*

Of ANNUITIES, LEASES, &c. *taken in* REVERSION.

CASE I.

Q. *How do you find the* prefent Worth *of an* Annuity, &c. *in* Reverfion ?

A. Thus ; *Firft,* find the *prefent Worth* of the yearly Sum at the given *Rate,* and for the Time of its Continuance ; to do which, there are given U, T, and R to find P, which is thus difcovered ;

$$\frac{rtt - rt + 2t}{2rt + 2} : \times u = p.$$

Secondly, Find what *Principal* being put to *Intereft* will amount to P, at the fame *Rate,* and for the Time to come before the *Annuity,* &c. commences ; and that will be the prefent *Worth* of the *Annuity,* &c. in *Reverfion :* Therefore let P be changed into A = the *Amount,* and then there will be given A, R, and T, to find P, or the *Principal,* which is thus difcovered ;

$$\frac{a}{tr + 1} = p.$$

EXAM-

EXAMPLES.

1. What is the prefent Worth of a Leafe of 30 *l. per Ann.* to continue 3 Years; but is not to commence till the End of 2 *Yrs.* allowing 4 *per Cent.* to the Purchafer? *Anfw.* 77 *l.* 7 *s.* 7.2 *d.*

2. I have the promife of a Penfion of 17 *l. per Ann.* for 7 Years, but it does not commence till the End of 4 Years; and I am willing to difpofe of the fame for prefent Payment, at the Rate of 5 *per Cent.* I demand the prefent Worth? *Anfw.* 84 *l.* 9 *s.* 6 *d.*

3. There is a Legacy of 20 *l. per Ann.* for 8 Years, left to a Perfon of 16 Years of Age; the Time of Payment is to commence at the Year of Perfection, *i. e.* at 21 Years; but he wanting a Sum of Mony, is minded to fell the fame at 4 *per Cent.* I demand the prefent Worth? *Anfw.* 115 *l.* 3 *s.* 0 *d.* 1.44 *qr.*

4. A good-natured Gentleman, being minded to beftow a Favour upon an unthankful Wretch, fettled upon him an Income of 35 *l. per Ann.* for 12 Years, to commence 5 Years after fuch Settlement; but he wanting Mony to follow his Extravagances, fold it at the Rate of 10 *per Cent.* I demand how much he received for the prefent Worth? *Anfw.* 197 *l.* 5 *s.* 5 *d.* 1.792 *qr.*

CASE 4.

Q. *How do you find the yearly Income of an* Annuity, *&c. in* Reverfion?

A. Thus; *Firft,* Find the *Amount* of the *prefent Worth* of the yearly Sum, at the given Rate, and for the *Time* before the *Reverfion*; to do which, there are given P, T, and R, to find A, which is thus difcovered;

$$ptr + p = a.$$

Secondly, Find what yearly Rent being fold, will produce A, for the *prefent Worth*, at the fame Rate, and for the *Time* of its Continuance; and that will be the yearly Sum required: Therefore change A into P, and then there will be given P, R, and T, to find U, or the yearly Sum, thus;

$$\frac{rt + 1}{rtt - rt + 2t} : \times 2p = u.$$

EXAMPLES.

1. There is a Leafe of an Houfe taken for 3 Years, but commences not till the end of 2 Years; and the Leffee would fell the fame for 77 *l.* 7 *s.* 7.2 *d.* prefent Payment, allowing 4 *per Cent.* to the Purchafer; I demand the yearly Rent? *Anfw.* 30 *l. per Ann.*

2. I have the Promife of a Penfion for 7 Years, which will not commence till the end of 4 Years; and I have difpofed of the fame for the prefent Payment of 84 *l.* 9 *s.* 6 *d.* allowing 5 *per Cent.* to the Purchafer; I demand the yearly Income? *Anfw.* 17 *l.*

3. There

3. There is a Legacy of a certain Rate *per Ann.* for 8 *Yrs.* left to a Perfon of 16 Years of Age; but the Time of Payment muſt not commence till the Age of Perfection; and the ſame Perſon wanting a Sum of Mony, ſold it for 115*l*. 3*s*. 0*d*. 2*qrs.* allowing 4 *per Cent.* to the Buyer; I demand the yearly Rate? *Anſw.* 70*l*.

4. A good-natured Gentleman, being minded to beſtow a Favour upon an unthankful Wretch, ſettled an Income upon him for 12 Years, at a certain Rate *per Ann.* to commence 5 Years after ſuch Settlement; but he wanting Mony to follow his Extravagances, ſold it for 197*l*. 5*s*. 5*d*. 2*qrs.* allowing 10 *per Cent.* to the Buyer for preſent Payment; I demand the yearly Value? *Anſw.* 35*l*.

Of SIMPLE INTEREST *for* DAYS.

Q. How do you find the Simple Intereſt *of any Sum of Mony, for any Number of* Days?

A. Multiply the *Intereſt* of one Pound for one Day, at the given *Rate*, by the *Principal*, and by the Number of *Days*; the laſt *Product* is the *Intereſt* required

Note, *The* Intereſt *of one* Pound *for one* Day *at*

1		is = .00002739726
2		is = .00005479452
3		is = .00008219178
4		is = .00010958904
5	*per Cent.*	is = .00013698630
6		is = .00016438356
7		is = .00019178082
8		is = .00021917808
9		is = .00024657534
10		is = .0002739726

EXAMPLES.

1. What is the Intereſt of 120*l*. for 126 Days, at 4 *per Cent.*? *Anſw.* 1*l*. 13*s*. 1*d*. 2*qrs.*+

2. What is the Intereſt of 126*l*. for 145 Days, at 6 *per Cent.*? *Anſw.* 3*l*. 0*s*. 0*d*. 3*qrs.*+

3. What is the Intereſt of 100*l*. from the 1ſt of *June*, 1770, to the 8th of *March* following, at 5 *per Cent.*? *Anſw.* 3*l*. 15*s*. 11*d*. 3*qrs.*

4. What is the Intereſt of 200*l*. from the 14th of *Auguſt*, 1770, to the 19th of *December* following, at 6 *per Cent.*? *Anſw.* 4*l*. 4*s*. 1*d*. 3*qrs.*+

5. What is the Intereſt of 10*l*. for 25 Days, at 5 *per Cent*? *Anſw.* 8*d*.+

6. What is the Intereſt of 40*l*. for 40 Days, at 4 *per Cent.* *Anſw.* 3*s*. 6*d*.+

Note, *There is another Way of anſwering* Queſtions *in* Intereſt *for* Days, *which is laid down in* Caſe 1, *in* Simple Intereſt, *Page* 132, *as appears by the eighth Queſtion in that Caſe. The Reader may uſe which he likes beſt; or both if he pleaſes.*

Of REBATE *or* DISCOUNT.

Q. *What particular* Letters *are ufed in* Rebate ?
A. Thefe ;
S. the Sum to be *difcounted.*
P, the *prefent Worth* of that Sum, due at any Time to come.
T, the *Time* before it becomes due.
R, the *Ratio,* or the Rate *per Cent.*

C A S E I.

Q. *When* S, T, *and* R, *are given to find* P ; *how is it difcovered ?*
A. Thus ; $\dfrac{s}{tr+1} = p.$

E X A M P L E S.

1. What is the prefent Worth of 795*l.* 11*s.* 2*d.* for 11 Months, at 6 *per Cent.* ? *Anfw.* 754*l.* 1*s.* 8*d.* +
2. What is the prefent Worth of 161*l.* 10*s.* for 19 Months, at 5 *per Cent.* ? *Anfw.* 149*l.* 13*s.* 0*d.* 3*qrs.* +
3. If a Legacy of 1000*l.* is left me the 24th of *July,* 1770, to be paid on the *Chriftmas-Day* following ; what muft I receive when I allow 6 *per Cent.* for prefent Payment ? *Anfw.* 975*l.* 3*s.* 0*d.* 3*qrs.* +

C A S E 2.

Q. *When* P, T, *and* R, *are given to find* S ; *how is it difcovered ?*
A. Thus ; $ptr + p = s.$

E X A M P L E S.

1. Suppofe I receive 754*l.* 1*s.* 8*d.* now, for a Sum of Mony, due 11 Months hence, allowing 6 *per Cent.* for prefent Payment ; I demand the Sum that was due at firft ? *Anfw.* 795*l.* 11*s.* 2*d.*
2. There is a certain Debt, payable 19 Months hence ; but I agree with the Debtor to pay me down 149*l.* 13*s.* 0*d.* $\frac{3}{4}$, and allow him 5 *per Cent.* for prefent Payment ; I demand how much the Debt is ? *Anfw.* 161*l.* 10*s.*
3. A Legacy was left me the 24th of *July* 1770, to be paid on the *Chriftmas-Day* following, but I agree with the Executor, and allow him 6 *per Cent.* for the prefent Payment of 975*l.* 3*s.* 0*d.* 3*qrs.* I demand what the Legacy was ? *Anfw.* 1000*l.*

C A S E 3.

Q. *When* S, P, *and* R, *are given to find* T ; *how is it difcovered ?*
A. Thus ; $\dfrac{s-p}{rp} = t.$

EXAMPLES.

1. The prefent Worth of 795 *l.* 11 *s.* 2 *d.* due for a certain Time to come, is 754 *l.* 1 *s.* 8 *d.* at 6 *per Cent.* I demand in what Time the firft Sum fhould have been paid, if no Rebate had been made? *Anfw.* 11 *Months*

2. There is 161 *l.* 10 *s.* due at a certain Time to come, but I allow 5 *per Cent.* to the Debtor, for the prefent Payment of 149 *l.* 13 *s.* 0 *d.* 3 *qrs.* I demand when the Sum fhould have been paid without any Rebate? *Anfw.* 19 *Months:*

3. I have received 975 *l.* 3 *s.* 0 *d.* 3 *qrs.* for a Legacy of 1000 *l.* allowing the Executor 6 *per Cent.* I demand when the Legacy was payable without Rebate? *Anfw.* 155 *Days.*

CASE 4.

Q. When S, P, *and* T, *are given to find* R ; *how is it difcovered?*

A. Thus ; $\dfrac{s - p}{tp} = r.$

EXAMPLES.

1. At what Rate *per Cent.* will 795 *l.* 11 *s.* 2 *d.* payable 11 Months hence, produce 754 *l.* 1 *s.* 8 *d.* for prefent Payment? *Anfw.* 6 *per Cent.*

2. At what Rate *per Cent.* will 161 *l.* 10 *s.* payable 19 Months hence, produce the prefent Payment of 149 *l.* 13 *s.* 0 *d.* 3 *qrs.?* *Anfw.* 5 *per Cent.*

3. Suppofe a Legacy of 1000 *l.* is left me the 24th of *July* 1770, to be paid on the *Chriftmas Day* following ; but I agree with the Executor for the prefent Payment of 975 *l.* 3 *s.* 0 *d.* 3 *qrs.* I demand the Rate *per Cent.* allowed for his Mony? *Anfw.* 6 *per Cent.*

Of EQUATION *of* PAYMENTS *(the true Way)*

Q. How is the equated Time *for the Payment of a Sum of* Mony, *due at feveral* Times, *found out?*

A. Thus, 1. Find the *prefent Worth* of each Payment for its refpective *Time,* as in *Rebate,* that is,

$$\frac{s}{tr + 1} = p.$$

2. Add all the *prefent Worths* together, and call that Sum alfo P ; then is $s - p = d$ the *Rebate.*

3. $\dfrac{d}{pr} = e$ is the true equated *Time.*

EXAMPLES.

1. *A* owes *B* 200 *l.* to be paid as follows, *viz.* 100 *l.* at 2
Months; and 100 *l.* at 4 Months; but they agree to have but
one Payment of the Whole, Rebate being made at 6 *per Cent.*
I demand the true equated Time? *Anfw.* 3 *Months.*

2. A Merchant hath owing him 300 *l.* to be paid as follows;
50 *l.* at 2 Months, 100 *l.* at 5 Months, and the reft at 8
Months; and it is agreed to have but one Payment of the
Whole, Rebate being made at 5 *per Cent.* I demand the
equated Time? *Anfw.* 5.9796 *Months.*

3. *F* owes to *H* 1000 *l.* whereof 200 *l.* is to be paid prefent;
400 *l.* at 5 Months; and the reft at 10 Months; but they agree to
have but one Payment of the Whole, at the Rate of 4 *per Cent.*
Rebate; I demand the true equated Time? *Anfw.* 181 *Days.*

4. A Man owes a Merchant 1200 *l.* to be paid as fol-
lows, 200 *l.* down, 500 *l.* at the End of 10 Months; and the
reft at the End of 20 Months; and they agree to have but one
Payment of the Whole, Rebate at 3 *per Cent.* I demand the
true equated Time? *Anfw.* 1 *Year*, 11 *Days.*

Of COMPOUND INTEREST.

Q. WHAT *particular* Letters *are ufed here?*
    A. Thefe;
P, the *Principal.*
T, the *Time;*
R, the *Amount* of 1 *l.* for 1 Year, at any given Rate;
A, the whole *Amount.*

Q. *How is the* Amount of 1 *l.* for 1 Year, *at any propofed*
Rate per Cent. *found?*

A. Thus; As 100 : 106 :: 1 : 1.06
            100 : 105 :: 1 : 1.05 &c.

A TABLE of the AMOUNTS of 1 *l.* for 1 Year.

Rates per Ct.	Amts. of 1 l.	Rates per Ct.	Amts. of 1 l.
2	1.02	6½	1.065
3	1.03	7	1.07
3½	1.035	7½	1.075
4	1.04	8	1.08
4½	1.045	8½	1.085
5	1.05	9	1.09
5½	1.055	9½	1.095
6	1.06	10	1.1

CASE

C A S E I.

Q. When P, T, *and* R, *are given to find* A; *how is it discovered?*

A. Thus; $p \times r^t = a$.

Note, R *must be involved so many times as the Number of Years direct,*
and that will be r^t

E X A M P L E S.

1. What Sum will 450*l.* amount to in three Years Time, at 5 *per Cent. per Ann.? Answ.* 520*l.* 18*s.* 7*d.* 2 *qrs.*

2. What will 400 *l.* amount to in 4 Years at 6 *per Cent. per Ann.? Answ.* 504*l.* 19*s.* 9*d.* 3.15264 *qrs.*

3. What will 480*l.* amount to in 6 Years at 5 *per Cent. per Ann.? Answ.* 643*l.* 4*s.* 11.0178*d.*

4. What is the Amount of 500 *l.* at 4¼ *per Cent. per Ann.* for 4 Years? *Answ.* 590*l.* 11*s.* 5*d.* 2.95+*qrs.*

C A S E 2.

Q. When A, R, *and* T, *are given to find* P; *how is it discovered?*

A. Thus; $\dfrac{a}{r^t} = p$.

E X A M P L E S.

1. What Principal must be put to Interest, to amount to the Sum of 520*l.* 18*s.* 7*d.* 2 *qrs.* in 3 Years, at 5 *per Cent. per Ann.? Answ.* 450*l.*

2. What Principal will amount to 504 *l.* 19*s.* 9*d.* 3.15264 *qrs.* in 4 Years, at 6 *per Cent. per Ann.? Answ.* 400 *l.*

3. What Principal will amount to 643*l.* 4*s.* 11.0178*d.* in 6 Years, at 5 *per Cent. per Ann.? Answ.* 480*l.*

4. What Principal will amount to 590*l.* 11*s.* 5*d.* 3*qrs.* in 4 Years, at 4¼ *per Cent. per Ann.? Answ.* 500*l.*

C A S E 3.

Q. When P, R, *and* A, *are given to find* T; *how is it discovered?*

A. Thus; $\dfrac{a}{p} = r^t$ $\Big\{$ which being continually divided by *r*, till nothing remains, the Number of those Divisions will be $= t$.

E X A M P L E S.

1. In what Time will 450*l.* amount to 520*l.* 18*s.* 7*d.* 2 *qrs.* at 5 *per Cent. per Ann.? Answ.* 3 *Years.*

2. In what Time will 400*l.* amount to 504*l.* 19*s.* 9*d.* 3.2 *qrs.* at 6 *per Cent. per Ann.? Answ.* 4 *Years.*

3. In

3. In what Time will 480 *l.* amount to 643 *l.* 4 *s.* 11.1 *d.* at 5 *per Cent. per Ann.? Answ.* 6 *Years.*

4. In what Time will 500 *l.* amount to 590 *l.* 11 *s.* 5 *d.* 3 *qrs.* at 4¼ *per Cent. per Ann.? Answ.* 4 *Years.*

C A S E 4.

Q. When P, A, *and* T, *are given to find* R, *how is it discovered?*

A. Thus; $\dfrac{a}{p} = r^t$ } which must be extracted by the Rules of Extraction; the Time given in the Question $= t$, shewing the Power.

E X A M P L E S.

1. At what Rate *per Cent.* will 450 *l.* amount to 520 *l.* 18 *s.* 7 *d.* 2 *qrs.* in 3 *Years? Answ.* 5 *per Cent.*

2. At what Rate *per Cent.* will 400 *l.* amount to 504 *l.* 19 *s.* 9 *d.* 3.2 *qrs.* in 4 *Years? Answ.* 6 *per Cent.*

3. At what Rate *per Cent.* will 480 *l.* amount to 643 *l.* 4 *s.* 11.1 *d.* in 6 *Years? Answ.* 5 *per Cent.*

4. At what Rate *per Cent.* will 500 *l.* amount to 590 *l.* 11 *s.* 5 *d.* 3 *qrs.* in 4 *Years? Answ.* 4¼ *per Cent.*

Of ANNUITIES *or* PENSIONS *in* ARREARS.

C A S E I.

Note, U *represents the* Annuity, Pension, *&c.* T, R, *and* A, *as before.*

Q. When U, T, *and* R, *are given to find* A; *how is it discovered?*

A. Thus; $\dfrac{ur^t - u}{r - 1} = a.$

E X A M P L E S.

1. What will an Annuity of 30 *l. per Ann.* payable yearly, amount to in 4 Years, at 5 *per Cent.? Answ.* 129 *l.* 6 *s.* cd. 3.6 *qrs.*

2. Suppose a Pension of 50 *l. per Ann.* payable yearly, be granted to a superannuated Officer; what is the Amount for 5 Years Forbearance at 4 *per Cent.? Answ.* 270 *l.* 16 *s.* 3 *d.* 3.4+*qrs.*

3. If the yearly Rent of an House which is 40 *l.* be forborn 7 Years, at 6 *per Cent.* what is the Amount? *Answ.* 335 *l.* 15 *s.* 0 *d.* 3.3+*qrs.*

4. If a Salary of 35 *l. per Ann.* to be paid yearly, be omitted for 6 Years, at 5½ *per Cent.* what is the Amount? *Answ.* 241 *l.* 1 *s.* 7 *d.* 2.5+*qrs.*

C A S E 2.

Q. When R, T, *and* A, *are given to find* U; *how is it discovered?*

A. Thus; $\dfrac{ra - a}{r^t - 1} = u.$

EXAM-

EXAMPLES.

1. What Annuity being forborn for 4 Years, will amount to 129*l*. 6*s*. 1*d*. at 5 *per Cent.?* *Answ.* 30 *l. per Ann.*

2. If a Pension being forborn for 5 Years, at 4 *per Cent. per Ann.* amounts to 270*l*. 16*s*. 4*d*. I demand how much it is *per Ann.? Answ.* 50*l. per Ann.*

3. If the yearly Rent of an House, being forborn for 7 Years, at 6 *per Cent.* amounts to 335*l*. 15*s*. 0*d*. 3.4*qrs*. I demand what the Rent is? *Answ.* 40*l. per Ann.*

4. If the Payment of a Salary be omitted 6 Years; I demand how much the Salary is, when the Amount is 241*l*. 1*s*. 7*d*. 2.6*qrs*. at 5½ *per Cent. Answ.* 35*l. per Ann.*

CASE 3.

Q. *When* U, A, *and* R, *are given to find* T; *how is it discovered?*

A. Thus; $\dfrac{ar + u - a}{u} = r^t$ ⎰ which being continually divided by *r*, till nothing remains, the Number of those Divisions will be $== t.$

EXAMPLES.

1. In what Time will 30 *l. per Ann.* amount to 129*l*. 6*s*. 1*d*. allowing 5 *per Cent.* for the Forbearance of Payment? *Answ.* 4 *Years.*

2. In what Time will a Pension of 50 *l. per Ann.* amount to 270*l*. 16*s*. 4*d*. at 4 *per Cent.? Answ.* 5 *Years.*

3. In what Time will the yearly Rent of an House, being 40 *l. per Ann.* amount to 335 *l*. 15*s*. 1*d*. at 6 *per Cent.* for Nonpayment? *Answ.* 7 *Years.*

4. In what Time will a Salary of 35 *l. per Ann.* amount to 241*l*. 1*s*. 7*d*. 2.6 *qrs.* at 5½ *per Cent.* for the Forbearance of Payment? *Answ.* 6 *Years.*

Note, *In this and the two next* Sections *might be placed* Case 4; *but because it requires an* Algebraic Method *of proceeding, in order to find* R, *I omit inserting it in its* Place; *this being designed to treat only of* Numbers.

Of the PRESENT WORTH *of* ANNUITIES, PENSIONS, *&c.*

Note, P *is the* Present Worth, U, T, *and* R, *as in the last.*

CASE I.

Q. *When* U, T, *and* R, *are given to find* P; *how is it discovered?*

A. Thus; $\dfrac{u - \dfrac{u}{r^t}}{r - 1} = p.$

EXAM-

EXAMPLES.

1. What is the yearly Rent of 20 *l.* to continue 6 Years, worth in ready Mony, at 5 *per Cent.? Anfw.* 101 *l.* 10 *s.* 3 *d.* 3 *qrs.*

2. What is the prefent Worth of a Penfion of 30 *l. per Ann.* for 5 Years, at 4 *per Cent.? Anfw.* 133 *l.* 11 *s.* 1 *d.*

3. What muft be the Difcount of a Leafe of 50 *l. per Ann.* when prefent Payment is made for 4 Years, at 3 *per Cent.? Anfw.* 14 *l.* 2 *s.* 10 *d.* 2 *qrs.*

4. An Houfe is lett upon Leafe for 4 Years at 70 *l. per Ann.* and the Leffee is defirous to make prefent Payment, provided the Leffor will allow him 5¼ *per Cent.* I demand how much muft be paid down, and how much difcounted?

Anfw. $\begin{cases} 243 \ l. \ 19 \ s. \quad 0 \ d. \ 3 \ qrs. \text{ to be paid down.} \\ 36 \ l. \quad 0 \ s. \quad 11 \ d. \quad 1 \ qr. \text{ to be difcounted.} \end{cases}$

CASE 2.

Q. When P, T, *and* R, *are given to find* U; *how is it difcovered?*

A. Thus; $\dfrac{pr^t \times r - pr^t}{r^t - 1} = u.$

EXAMPLES.

1. What Annuity or yearly Rent to continue 6 Years, may be purchafed for 101 *l.* 10 *s.* 3 *d.* 3 *qrs.* at 5 *per Cent.? Anfw.* 20 *l.*

2. Suppofe the prefent Payment of 133 *l.* 11 *s.* 1 *d.* were required for a Penfion for 5 Years to come, at 4 *per Cent.* what is that Penfion? *Anfw.* 30 *l. per Ann.*

3. If the prefent Payment of 185 *l.* 17 *s.* 1 *d.* 2 *qrs.* be made for the Leafe of an Houfe, 4 Years to come, at 3 *per Cent.* what is the yearly Rent? *Anfw.* 50 *l. per Ann.*

4. If an Houfe is lett upon Leafe for 4 Years, and the Leffee makes prefent Payment of 243 *l.* 19 *s.* 0 *d.* 3 *qrs.* for that Time, at 5¼ *per Cent.* what is the yearly Rent of that Houfe? *Anfw.* 70 *l. per Ann.*

CASE 3.

Q. When U, P, *and* R, *are given to find* T; *how is it difcovered?*

A. Thus; $\dfrac{u}{p + u - pr} = r^t$ $\begin{cases} \text{which being continually divided} \\ \text{by } r, \text{ till nothing remains, the} \\ \text{Number of thofe Divifions will} \\ \text{be} = t. \end{cases}$

EXAMPLES.

1. How long may a Leafe of 20 *l.* yearly Rent be had for 101 *l.* 10 *s.* 3 *d.* 3 *qrs.* allowing 5 *per Cent.* to the Purchafer? *Anfw.* 6 *Years.*

2. I

2. I demand what Time a Leafe of 30 *l. per Ann.* may be purchafed for; when prefent Payment of 133 *l.* 11 *s.* 1 *d.* is made at 4 *per Cent.? Anfw.* 5 *Years.*

3. If 185 *l.* 17 *s.* 1 *d.* 2 *qrs.* be paid down for a Leafe of 50 *l. per Ann.* at 3 *per Cent.* how long is the Leafe purchafed for ? *Anfw.* 4 *Years.*

4. An Houfe is lett upon Leafe for 70 *l. per Ann.* and the Leffee makes prefent Payment of 24; *l.* 19 *s.* 0 *d.* 3 *qrs.* he being allowed 4¾ *per Cent.* I demand how long the Leafe is purchafed for ? *Anfw.* 4 *Years.*

Of ANNUITIES, LEASES, &c. *taken in* REVERSION.

CASE I.

Q. *How many* Operations *are there in* Cafe 1 ?
A. Two.
Q. *What is the* Firft ?
A. Find the *prefent Worth* of the yearly *Sum* at the given *Rate,* and for the given *Time* of its Continuance ; to do which, there are given U, T, and R, to find P.
Q. *How is* P *difcovered ?*

A. Thus ; $\dfrac{a - \dfrac{u}{r^t}}{r - 1} = p.$

Q. *What is the* Second ?
A. Find what *Principal* being put to Intereft will amount to P, at the fame *Rate,* and for the *Time* to come before the *Annuity* commences, and that will be the *prefent Worth* of the Annuity, &c. in *Reverfion*; therefore let P be changed into A = the Amount, and then there will be given *A,* R, and *T,* to find P, or the *Principal.*
Q. *How is* P *difcovered?*

A. Thus ; $\dfrac{a}{r^t} = p.$

EXAMPLES.

1. What is the prefent Worth of the Reverfion of a Leafe of 20 *l. per Ann* to continue 4 Years, but not to commence till the End of two Years, allowing 5 *per Cent.* to the Purchafer ? *Anfw.* 64 *l.* 6 *s.* 6 *d.* 1.4 + *qr.*

2. There

2. There is a Leafe of certain Lands worth 32 *l. per Ann.* which is yet in being for 4.Years ; and the Leffee is defirous to take a Leafe in Reverfion for 7 Years, to begin when the old Leafe fhall be expired ; I demand the prefent Worth of the faid Leafe in Reverfion, allowing 5 *per Cent.* to the Purchafer ? *Anfw.* 152 *l.* 6 *s.* 8 *d.* 2 *qrs.* +

3. There is a Houfe now building, which I have a mind to take a Leafe of for 8 Years ; but the Houfe will not be finifhed within 2 Years ; I demand how much I muft pay down, when the yearly Rent is 100 *l.* and the Landlord allows me 4 *per Cent.* on prefent Payment ? *Anfw.* 622 *l.* 9 *s.* 7.2 *d.*

CASE 2.

Q. *How many Operations are there in* Cafe 2 ?
A. Two.
Q. *What is the* Firft ?
A. Find the *Amount* of the prefent Worth of the yearly Sum at the given *Rate,* and for the Time before the Annuity commences, to do which there are given *P, R,* and *T,* to find *A.*

Q. *How is* A *difcovered ?*

A. Thus ; $pr^t = a.$

Q. *What is the* Second ?
A. Find what yearly Rent being fold will produce *A* for the *prefent Worth,* at the fame Rate, and for the Time of its Continuance ; and that will be the yearly *Sum* required : Therefore let *A* be changed into *P,* and then there will be given *P, R,* and *T,* to find *U,* or the yearly *Sum.*

Q. *How is* U *difcovered?*

A. Thus ; $\dfrac{\overline{pr^t \times r - pr^t}}{r^t - 1} = u.$

EXAMPLES.

1. What Annuity or yearly Rent to be entered upon 2 Years hence, and then to continue 4 Years, may be purchafed for 64 *l.* 6 *s.* 6 *d.* 2 *qrs.* ready Mony, at 5 *per Cent.* ? *Anfw.* 20 *l.*

2. There is a Leafe of certain Lands in being for 4 Years, and the Leffee being minded to take a Leafe in Reverfion for 7 Years, to begin when the old Leafe fhall be expired, laid down 152 *l.* 6 *s.* 8 *d.* 2 *qrs.* I demand the yearly Rent of the faid Lands, when Allowance was made to the Leffee at 5 *per Cent.* ? *Anfw.* 32 *l. per Ann.*

3. The

3. The prefent Payment for the Leafe of an Houfe is 622*l*. 9*s*. 7.2*d*. Now I have taken a Leafe in Reverfion for 8 Years, which is to commence at the End of two Years; I demand how much the yearly Rent is, when for the faid prefent Payment I was allowed 4*l*. *per Cent.*? *Anfw.* 100*l*. *per Annum.*

C A S E 3.

Q. *How many Operations are there in* Cafe 3?
A. Two.
Q. *What is the* Firft?
A. Find the Amount of the prefent Worth of the yearly Sum at the given Rate, and for the Time before the Annuity, *&c.* commences; to do which there are given *P, R,* and *T,* to find *A,* as in Cafe 2.
Q. *How is* A *difcovered?*

A. Thus; $pr^t = a$.

Q. *What is the* fecond Operation?
A. Find what Time the yearly Rent given, being fold for will produce *A* for the prefent Worth, at the fame Rate, and that will be the Time required: Therefore change *A* into *P,* and then there will be given *U, P,* and *R,* to find *T,* as in Cafe 3, *Page* 160.
Q. *How is* T *difcovered?*

A. Thus; $\dfrac{u}{p + u - pr} = r^t$ $\begin{cases} \text{which being continually divi-} \\ \text{ded by } r, \text{ till nothing remains,} \\ \text{the Number of thofe Divifions} \\ \text{will be} = t. \end{cases}$

E X A M P L E S.

1. The prefent Worth of a certain Leafe in Reverfion is 64*l*. 6*s*. 6*d*. 2*qrs*. the Leafe is 20*l*. *per Ann.* and commences two Years hence, and the Allowance to the Purchafer is 5 *per Cent.* I demand the Time of its Continuance? *Anfw.* 4 *Years.*

2. A certain Man took a Leafe of fome Lands for a Time, which by Agreement was not to commence till the Expiration of 4 Years; the yearly Rent was 32*l*. it was alfo agreed, that the Purchafer fhould lay down 152*l*. 6*s*. 8*d*. 2*qrs*. and be allowed for his prefent Pay 5 *per Cent.* I demand the Time that the Leafe was taken for? *Anfw.* 7 *Years.*

3. The prefent Payment for the Leafe of an Houfe is 622*l*. 9*s*. 7.2*d*. and the yearly Rent is 100*l*. Now I have taken a Leafe in Reverfion, which is to commence at the End of 2 Years; I demand the Length of the Leafe, when I was allowed 4 *per Cent.* for my Mony? *Anfw.* 8 *Years.*

Of

Of *purchasing* REAL *or* FREEHOLD ESTATES.

Q. What do you understand by a Real *or* Freehold Estate ?
A. Such as is bought to continue for ever.

Note, U, *represents the* yearly Rent ; R, *the* Amount *of* 1 *l.* &c.
and P, *the* present Worth.

CASE I.

Q. When U, *and* R, *are given to find* P ; *how is it discovered ?*
A. Thus ; $\dfrac{u}{r-1} = p.$

EXAMPLES.

1. Suppose a Freehold Estate of 40 *l. per Ann.* is to be sold ;
what is it worth, allowing the Buyer 5 *per Cent.* for his Mony ?
Answ. 800 *l.*

2. What is an Estate of 290 *l. per Ann.* to continue for ever,
worth in present Mony, allowing 4 *per Cent.* to the Buyer ?
Answ. 7250 *l.*

CASE 2.

Q. When P, *and* R, *are given to find* U ; *how is it discovered?*
A. Thus ; $p \times \overline{r-1} = u.$

EXAMPLES.

1. If a Freehold Estate is bought for 800 *l.* and the Allow-
ance of 5 *per Cent.* is made to the Buyer ; I demand the yearly
Rent ? *Answ.* 40 *l. per Ann.*

2. If an Estate be sold for 7250 *l.* present Mony ; and 4 *per
Cent.* is allowed to the Buyer for the same ; I demand the
yearly Rent ? *Answ.* 290 *l. per Ann.*

CASE 3.

Q. When P, *and* U, *are given to find* R ; *how is it discovered?*
A. Thus ; $\dfrac{p+u}{p} = r.$

EXAMPLES.

1. If a Real Estate of 40 *l. per Ann.* be sold for 800 *l.* I
demand the Rate *per Cent.* ? *Answ.* 5 *per Cent.*

2. If a Freehold Estate of 290 *l. per Ann.* be bought for
7250 *l.* I demand the Rate *per Cent.* allowed ? *Answ.* 4 *per
Cent.*

Of

Of purchasing Freehold Estates in Reversion.

Case I.

Q. *How many Operations are there in* Case 1?
A. Two.
Q. *What is the* First?
A. Find the *present Worth* of the yearly Sum at the given *Rate*, to do which, there are given U, and R, to find P.
Q. *How is* P *discovered?*

A. Thus; $\dfrac{u}{r-1} = p$.

Q. *What is the second* Operation?
A. Find what *Principal* being put to *Interest* will amount to P, at the same *Rate*, and for the Time to come before the Estate commences, and that will be the *present Worth* of the Estate in *Reversion:* Therefore let P be changed into $A =$ the *Amount*, and then there will be given A, R, and T, to find $P =$ the *Principal*.
Q. *How is* P *discovered?*

A. Thus; $\dfrac{a}{r^{t}} = p$.

Examples.

1. Suppose a Freehold Estate of 40 *l. per Ann.* to commence 3 Years hence, is to be sold, what is it worth, allowing the Purchaser 5 *per Cent.* for his present Payment? *Answ.* 691 *l.* 1 *s.* 4 *d.* 3 *qrs.*+
2. What is an Estate of 290 *l. per Ann.* to continue for ever, but not to commence till the Expiration of 4 Years, worth in present Mony, Allowance being made at 4 *per Cent.*? *Answ.* 6197 *l.* 6 *s.* 5 *d.* 2 *qrs.*+

Case 2.

Q. *How many Operations are there in* Case 2?
A. Two.
Q. *What is the* First?
A. Find the *Amount* of the *present Worth* of the yearly Rent, at the given *Rate*, and for the *Time* before the Estate commences; to do which there are given P, T, and R, to find A.
Q. *How*

Q. How is A *difcovered?*

A. Thus ; $pr^t = a$.

Q. What is the fecond Operation ?

A. Find what yearly Rent being fold will produce *A* for the *prefent Worth,* at the fame *Rate,* and that will be the yearly Sum required : Therefore let *A* be changed into *P,* and then there will be given *P,* and *R,* to find *U,* or the yearly *Sum.*

Q. How is U *difcovered?*

A. Thus ; $\dfrac{\overline{pr \times r} - pr}{r} = u$.

EXAMPLES.

1. Suppofe a Freehold Eftate, to commence 3 Years hence, is fold for 691 *l.* 1 *s.* 5 *d.* allowing to the Purchafer 5 *per Cent.* I demand the yearly Income ? *Anfw.* 40 *l. per Ann.*

2. There is a certain Freehold Eftate bought for 6197 *l.* 6 *s.* 5 *d.* 2 *qrs.* which does not commence till the Expiration of 4 Years; the Buyer was allowed 4 *per Cent.* for his Mony ; I demand the yearly Income ? *Anfw.* 290 *l. per Ann.*

Of REBATE *or* DISCOUNT.

Q. What particular Letters *are ufed here ?*

A. Thefe ;

S, the Sum to be difcounted for ;

P, the prefent Worth of that Sum, due at any Time to come ;

T, the Time before it becomes due ; and

R, the Amount of 1 *l.* for 1 Year, at any Rate *per Cent.*

CASE I.

Q. When S, T, *and* R, *are given to find* P ; *how is it difcovered?*

A. Thus ; $\dfrac{s}{r^t} = p$.

EXAMPLES.

1. What is the prefent Worth of 520 *l.* 18 *s.* 7 *d.* 2 *qrs.* payable 3 Years hence, at 5 *per Cent* ? *Anfw.* 450 *l.*

2. There is a Debt of 504 *l.* 19 *s.* 9 *d.* 3 *qrs.* which is not due until 4 Years hence, but it is agreed to be paid in prefent Mony ; what Sum muft the Creditor receive, allowing the Rebate of 6 *per Cent.* to the Debtor for his Mony ? *Anfw.* 400 *l.*

3. If

3. If 643 *l.* 4 *s.* 11 *d.* be payable in 6 Years Time ; what is the prefent Worth, Rebate being made at 5 *per Cent.?* *Anſw.* 480 *l.*

CASE 2.

Q. *When* P, T, *and* R, *are given to find* S ; *how is it diſcovered ?*

A. Thus ; $p \times r^t = s$.

EXAMPLES.

1. If 450 *l.* be received for a Debt, payable 3 Years hence, and an Allowance of 5 *per Cent.* was made to the Debtor for his prefent Payment ; I demand what the Debt was ? *Anſw.* 520 *l.* 18 *s.* 7 *d.* 2 *qrs.*

2. There is a Sum of Mony, due at the Expiration of 4 Years, but the Creditor agrees to take 400 *l.* down, allowing 6 *per Cent.* on prefent Payment ; I demand what the Debt was ? *Anſw.* 504 *l.* 19 *s.* 9 *d.* 2 *qrs.*

3. If a Sum of Mony, due 6 Years hence, produces 480 *l.* for prefent Payment, Rebate being made at 5 *per Cent.* I demand how much the Debt was ? *Anſw.* 643 *l.* 4 *s.* 11 *d.*

CASE 3.

Q. *When* S, P, *and* R, *are given to find* T ; *how is it diſcovered ?*

A. Thus ; $\dfrac{s}{p} = r^t$ $\begin{cases} \text{which being continually divided by } r, \text{ till} \\ \text{nothing remains, the Number of thofe} \\ \text{Divifions will be} = t. \end{cases}$

EXAMPLES.

1. A certain Man received 450 *l.* down, for a Debt of 520 *l.* 18 *s.* 7 *d.* 2 *qrs.* Rebate being made at 5 *per Cent.* I demand in what Time the Debt was payable ? *Anſw.* 3 *Years.*

2. There is a Debt of 504 *l.* 19 *s.* 9 *d.* 3 *qrs.* payable at a certain Time ; but it is agreed to pay 400 *l.* down at the Allowance of 6 *per Cent.* to the Debtor for his prefent Mony ; I demand in what Time the Debt would become due, if no fuch Payment was to be made ? *Anſw.* 4 *Years.*

3. The prefent Payment of 480 *l.* is made for a Debt of 643 *l.* 4 *s.* 11 *d.* Rebate at 5 *per Cent.* I demand when the Debt was payable ? *Anſw.* 6 *Years.*

CASE

CASE 4.

Q. *When* S, P, *and* T, *are given to find* R ; *how is it discovered ?*

A. Thus ; $\frac{s}{p} = r$ $\Big\{$ which muſt be extracted by the Rules of Extraction ; the Time given in the Queſtion $= t$, ſhewing the Power.

EXAMPLES.

1. The preſent Worth of 520 *l*. 18 *s*. 7 *d*. 2 *qrs*. payable 3 Years hence is 450 *l*. I demand at what Rate *per Cent*. Rebate is made ? *Anſw*. 5 *per Cent*.

2. A Debt of 504 *l*. 19 *s*. 9 *d*. 3 *qrs*. will be due 4 Years hence ; but it is agreed to take 400 *l*. down ; what is the Rate *per Cent*. that the Rebate is made at ? *Anſw*. 6 *per Cent*.

3. The Sum of 643 *l*. 4 *s*. 11 *d*. is payable in 6 Years Time ; and the preſent Worth of that Sum is 480 *l*. I demand at what Rate *per Cent*. muſt Rebate be made, to produce the ſaid preſent Worth ? *Anſw*. 5 *per Cent*.

Note 1. *Equation of Payments at Compound Intereſt, ſhould follow next, but as that Rule is beſt done by the Logarithms, the kind Reader will, I hope, take this as a ſufficient Reaſon for not placing it here.*

2. *The whole Buſineſs of Compound Intereſt is better performed by the Logarithms, or by Tables calculated for that Purpoſe, than otherwiſe ; eſpecially when the Time given is very long, as for* 20, 30, *or* 40 *Years, and when the Payments are to be made half-yearly or quarterly. What is here done ſerves only for whole Years, and ſhews what can be done by the* Pen, *where the* Logarithms *or* Tables *are wanting.*

A practical and eaſy *Method* to caſt up the *Value* of *Timber.*

Rule. Multiply the Number of *Feet* by the *Price* in (*Shillings*) per *Load*, and cut off 3 Places to the right Hand, which make *Pounds* and Decimal Parts thereof.

EXAMPLES.

754 Feet at 1 *l*. 7 *s*. 6 *d*. *per* Load

754   754 at 6 *d*. = 377
27

30358
+ 377

        l. *s*. *d*.
20.735 = 20 14 $9\frac{1}{4}$

856 Feet at 1 *l*. 6 *s*. *per* Load.
      Facit 22 *l*. 5 *s*. 1 *d*. $\frac{1}{4}$

730 Feet at 1 *l*. 8 *s*. 6 *d*. *per* Load.
      Facit 20 *l*. 16 *s*. 1 *d*.

433 Feet at 1 *l*. 3 *s*. 6 *d*. *per* Load.
      Facit 10 *l*. 3 *s*. 6 *d*.

Demonſtration. 50 *Feet* make a *Load* ; therefore it is, As 50 *Feet* . . Price in *Shillings* : : *Feet* given . . Value in *Shillings*, which ÷ 20 are *Pounds* : But as 50 × 20 = 1000 which is a *Diviſor* for *Pounds* ; therefore the firſt Figure being 1, and the reſt Cyphers, *Diviſion* is made at once by pointing off three Places as above.

THE

Schoolmasters Assistant.

PART IV.

A Collection of QUESTIONS *to exercise the foregoing* RULES.

1. WRITE down nine Hundred Millions, seven Hundred sixty Thousand, and Twenty-one.

2. What must 20 *s.* pay towards a Tax, when 326 *l.* 6 *s.* 8 *d.* is assessed at 41 *l.* 16 *s.* 2 *d.?* *Answ.* 2 *s.* 6 *d.* 2 *qrs.* $\frac{77600}{78320}$.

3. If the $\frac{1}{3}$ of 6 be 3; what will the $\frac{1}{4}$ of 20 be? *Answ.* 7 $\frac{1}{2}$.

4. I demand the Sum of 1748 added to itself? *Answ.* 3495.

5. I demand the Product of 76 multiplied by itself? *Answ.* 5776.

6. I demand the Difference between 14676 and the Fourth of itself? *Answ.* 11007.

7. I demand the Quotient of the Square of 476 divided by the Half of its Root? *Answ.* 952.

8. There is, in 3 Bags, the Sum of 1468 *l.* *viz.* in the first Bag 461 *l.* in the second 581 *l.* I demand what is in the third Bag? *Answ.* 426 *l.*

9. What Number is that which being multiplied by 13, the Product will be 221? *Answ.* 17.

10. Two Persons *A* and *B*, owe several Debts; the lesser Debt, being that of *A*, is 2173 *l.* the Difference is 371 *l.* what is the Debt of *B*? *Answ.* 2544 *l.*

11. A Captain and 160 Sailors took a Prize, worth 1360 *l.* of which the Captain had $\frac{1}{5}$ for his Share, and the rest was equally divided among the Sailors; what was each Man's Part? *Answ. The Captain had* 272 *l. and each Sailor had* 6 *l.* 16 *s.*

12. An ancient Lady being demanded how old she was; to avoid a direct answer, said, I have 9 Children, and there are 3 Years between the Birth of each of them; the Eldest was born when I was 19 Years old, which is now exactly the Age of the Youngest: how old was the Lady? *Answ.* 62 *Years old.*

I   13. What

13. What Number is that from which if you take 341, the Remainder will be 726? *Anfw.* 1067.

14. What Number is that which being added to 168, makes the Sum to be 706? *Anfw.* 538.

15. What Number is that which being divided by 19, the Quotient will be 72? *Anfw.* 1368.

16. A Broker bought for his Principal, in the Year 1720, 400 *l.* Capital Stock in the *South Sea,* at 650 *per Cent.* and fold it again when it was worth but 130 *per Cent.* how much was loft in the Whole? *Anfw.* 2080 *l.*

17. The Sum of two Numbers is 4139, their Difference is 948; what is the leffer Number? *Anfw.* 1595.5

18. A Gentleman went to Sea at 17 Years of Age; 8 Years after that he had a Son born, who lived 46 Years, and died before his Father; after whom the Father lived twice 20 Years, and then died alfo; I demand the Age of the Father when he died? *Anfw.* 111 *Years.*

19. Three Gardeners, *A, B,* and *C,* having bought a Piece of Ground, find the Profits of it amount to 120 *l. per Annum:* Now the Sum of Mony which they laid down was in fuch Proportion, that as often as *A* paid 5 *l.* *B* paid 7 *l.* and as often as *B* paid 4 *l.* *C* paid 6 *l.* I demand how much each Man muft have *per Annum* of the Gain?

B		*A*		*B*		*A*			*l.*	*s.*	*d.*
7	:	5	::	4	:	$2\frac{6}{7}$		*Anfw.* *A*	26	13	4
A		*C*		*A*		*C*		*B*	37	6	8
$2\frac{6}{7}$	:	6	::	5	:	$10\frac{1}{2}$		*C*	56	0	0
									120	0	0

20. *A, B,* and *C,* freight a Ship with Wine, *viz.* *A* lays out 1342 *l.* *B* 1178 *l.* *C* 630 *l.* the whole 212 Tuns are fold at 32 *l. per* Tun; what fhall each Man receive?

		l.	*s.*	*d.*	*qr.*
Anfw.	*A*	2890	3	11	$3\frac{1230}{3150}$
	B	2537	$\frac{2}{3150}$		
	C	1356	16	0	

21. *A, B,* and *C,* made up a Stock of 1000 *l.* whereof *A* put in 409 *l.* *B* 198 *l.* and they improved it to 1964 *l.* I demand what was the Stock of *C,* and what was each Man's Share of the whole Gain?

		l.	*s.*	*d.*
Anfw.	C's Stock was	393	0	0
	A's Share was	803	5	$6\frac{740}{1000}$
	B's -----	388	17	$5\frac{280}{1000}$
	C's -----	771	17	$0\frac{480}{1000}$

22. *A*

22. *A, B,* and *C,* freight a Ship for the *Canaries* worth 3696 *l.* whereof *A* put in 369 *l. B* 597 *l.* but by reafon of a Storm, one third of the Goods were caft overboard; I demand each Man's Share of the Lofs? *Anfw.* A's *Lofs was* 123 *l.* B's 299 *l. and* C's 810 *l.*

23. *A* and *B* traded together, and gained 100 *l. A* put in 640 *l. B* put in fo much that he muft receive 60 *l.* of the Gain; I demand how much *B* put in? *Anfw.* 960 *l.*

24. What is the Value of 27 Dozen, 10 *lb* of Candles, at 5 *d. per lb.? Anfw.* 6 *l.* 19 *s.* 2 *d.*

25. Bought 28 *qrs.* 2 *bufh.* of Wheat, at 4 *s.* 6 *d. per* Bufhel; what is the Worth of it? *Anfw.* 50 *l.* 17 *s.*

26. If a Man earn 2 *s* 6 *d.* 2 *qrs. per* Day, how much is that for 19 Weeks, *Sundays* excepted; *Anfw.* 14 *l.* 9 *s.* 9 *d.*

27. *A, B,* and *C,* traded together, the firft laid in I know not how much; *B* put in 20 Pieces of Cloth; and *C* put in 500 *l.* and they have gained 1000 *l.* whereof *A* ought to have 350 *l.* and *B* 400 *l.* I demand *C's* Share, how much the firft Man laid in, and what the 20 Pieces of Cloth were worth? *Anfw.* C's *Share was* 250 *l.* A *laid in* 700 *l. and* B's *Cloth was worth* 800 *l*

28. A Merchant buys up fix Bags of *Canterbury* Hops, No 1 of which weighed *C. wt.* 3 3 20. No 2. *C. wt.* 3 2 26. No. 3. *C. wt.* 3 0 24. No. 4. *C. wt* 3 3 only, No 5. *C. wt.* 2 2 22. No. 6. *C. wt.* 2 2 26, befides 5 Pockets, 3 of which weighed 76 *lb.* ¼ each, and the other two 62 *lb.* ¼ each: How many *C. wt.* has he to pay Carriage for? *Anfw. C. wt.* 23 0 24¾.

29. How many Ducats muft I deliver at *Venice,* to receive at *London* 178 *l.* 2 *s.* the Exchange being at 4 *s.* 4 *d. per* Ducat? *Anfw.* 822 Ducats.

30. A Traveller would change 500 *French* Crowns at 4 *s.* 6 *d. per* Crown, into Sterling Mony, but he muft pay a Halfpenny *per* Crown for Change; how much muft he receive; *Anfw.* 111 *l.* 9 *s.* 2 *d.*

31. When a Factor taketh 1 *l. per Cent.* for his Commiffion, what muft he have for 743 *l.* 17 *s.* 3 *d.? Anfw.* 7 *l.* 8 *s.* 9 *d.* 1 *qr.* $\frac{192}{2400}$.

32. Two Merchants in Company gained 100 *l. A* laid in fo much, that for his Share of the Gain he muft have 60 *l. B* laid in 720 Ducats at 6 *s.* 8 *d. per* Ducat; I demand how much *A* laid in, and what the Ducats were worth? *Anfw.* A *laid in* 360 *l. and the Ducats were worth* 240 *l.*

33. There

33. There were two Merchants, who traded in Company; The first laid in the Sum of 640 *l.* and took $\frac{5}{8}$ of the Gain: I demand how much the second Merchant laid in ? *Answ.* 384 *l.*

34. What Number is that, which being multiplied by 15, the Product will be $\frac{3}{4}$? *Answ.* $\frac{1}{20}$.

35. I demand the $\frac{5}{8}$ of 20 Shillings ? *Answ.* 12 *s.* 6 *d.*

36. What Fraction is that, to which if you add $\frac{2}{3}$ the Sum will be $\frac{3}{5}$? *Answ.* $\frac{11}{30}$.

37. What Number is that, to which if you add $7\frac{2}{3}$ the Whole will be $12\frac{1}{4}$? *Answ.* $4\frac{7}{12}$.

38. What Number is that, from which if you take $\frac{3}{5}$ the Remainder will be $\frac{1}{8}$? *Answ.* $\frac{29}{40}$.

39. What Number is that, from which if you take $13\frac{1}{2}$ the Remainder will be $5\frac{5}{7}$? *Answ.* $19\frac{3}{14}$.

40. What Number is that, which being divided by $\frac{3}{4}$ the Quotient will be 21 ? *Answ.* $15\frac{3}{4}$.

41. What Number is that, which being multiplied by $\frac{2}{3}$ produceth $\frac{1}{4}$? *Answ.* $\frac{3}{8}$.

42. What Number is that, from which if you take $\frac{2}{5}$ of it-self, the Remainder will be 12 ? *Answ.* 20.

43. What Part of 25 is $\frac{1}{8}$ of an Unit ? *Answ.* $\frac{1}{20}$.

44. What Number is that, to which if you add its own $\frac{2}{3}$, the Whole shall be 20 ? *Answ.* 12.

45. What Number is that, which maketh 9 to be the $\frac{2}{3}$ of it ? *Answ.* $13\frac{1}{2}$.

46. If a Cannon may be discharged at twice with 6 *lb.* of Powder; how many times will 7 *C.* 3 *qrs.* 17 *lb.* discharge the same Piece ? *Answ.* 295 Times.

47. If $\frac{3}{8}$ of a Ship be worth 3740 *l.* what is the Whole worth ? *Answ.* 9973 *l.* 6 *s.* 8 *d.*

48. A young Man received 210 *l.* which was $\frac{2}{3}$ of his elder Brother's Portion ; now three times the elder Brother's Portion was half of the Father's Estate ; I demand how much the Estate was ? *Answ.* 1890 *l.*

49. A factor bought a certain Quantity of broad Cloth, and Drugget, which together cost him 81 *l.* The Quantity of broad Cloth that he bought was 50 Yards, at 18 *s. per* Yard, and for every five Yards of broad Cloth, he had nine Yards of Drugget ; I demand how many Yards of Drugget he had, and how much the Drugget cost him *per* Yard ? *Answ.* 90 *Yards of Drugget at* 8 *s. per Yard*

50. A

50. A certain Usurer lent out 90 *l.* for 12 Months, and received Principal and Interest 95 *l.* 8 *s.* I demand at what Rate *per Cent.* he received Interest? *Answ.* 6 *l. per Cent.*

51. Two Men depart both from one Place, the one goes *North*, and the other *South*, the one goes 7 Miles a Day, and the other 11 Miles a Day; how far are they distant the 12th Day after their Departure? *Answ.* 216 *Miles.*

52. A Merchant bought 8 Tuns of Wine, which having received Damage, he sold for 400 *l.* and 12 *l. per Cent.* Loss; I demand how much it cost him *per* Tun, and how he sold it *per* Gallon, to lose after the said Rate?

Answ. $\begin{cases} \text{Cost} - 56 \, l. & 0 \, s. \quad 0 \, d. \text{ per Tun.} \\ \text{Sold at} \quad 0 \, l. & 3 \, s. \quad 11 \, d. \quad 2 \, qrs. \frac{960}{2010} \text{ per Gallon.} \end{cases}$

53. Two Men depart both from one Place, and both go the same Road; the one travels 12 Miles every Day, the other 17 Miles every Day; how far are they distant the tenth Day after their Departure? *Answ.* 50 *Miles.*

54. If a Gentleman hath an Estate of 1000 *l. per Ann.* how much may he spend one Day with another, to lay up threescore Guineas at the Year's End? *Answ.* 2 *l.* 11 *s.* 4 *d.* $\frac{40}{365}$.

55. If 76 *lb.* of Cinnamon cost 40 *l.* 10 *s.* 8 *d.* and 1 *C. wt.* of Nutmegs 59 *l.* 14 *s.* 8 *d.* I demand the Price of 3 *oz.* one with another? *Answ.* 2 *s.*

56. A Grocer delivered 17 *C.* 3 *qrs.* 10 *lb.* of Tobacco in the Roll, to be cut and dried, and when it came home, it held out 16 *C.* 0 *qrs.* 14 *lb.* I demand how much was lost in every *lb.?* and also supposing it cost in the Roll 8 *d.* $\frac{6}{7}$ *per lb.* and the cutting 1 *d.* $\frac{3}{8}$ *per lb.* I demand what it now stands him in?

Answ. $\begin{cases} \text{Lost per lb. 1 oz. 8 dr.} \frac{1200}{1998}. \\ \text{It stands him in 87 } l. \text{ 5 } s. \text{ 3 } d. \text{ 1 } qr. \frac{16}{16}. \end{cases}$

57. If Tallow be sold for 4 *d. per lb.* what is the Value of 3 Tubs, each 3 *C.* 1 *qr.* 10 *lb.* Gross, Tare *per* Tub 25 *lb.?* *Answ.* 17 *l.* 9 *s.*

58. Ship'd from *Spain* 10 Tuns of Wine, at 10 *l.* Sterling *per Hhd.* paid Custom at the Port of *London* 1 *s. per* Gallon: The Charges for Lighterage, Cartage, and Porterage, amounted to 5 *l.* afterwards by the Misfortune of a Pipe staving, containing 126 Gallons, I lost 59 Gallons; the next Day 28 Gallons more run out, and the Remainder of the Pipe not being saleable, I threw it away: The Market Price not running high, I sold the rest for 17 *l. per Hhd.* I demand how much I gain'd or lost by the Sale of the said Wine? *Answ. Gain'd* 115 *l.*

59. A Ship's Company took a Prize of 300 *l.* which is to be divided among them as Parties, according only to their Pay, and the Time they have been on board; the Officers and Midshipmen 5 Months, and the Sailors 3 Months. The Officers, one with another, had 40 *s. per* Month: The Midshipmen 30 *s. per* Month, and the Sailors 22 *s.* There were 6 Officers, 12 Midshipmen, and 84 Sailors; what must each Party have of the Prize, and what each single Person?

		l.	*s.*	*d.*	*qr.*			*l.*	*s.*	*d.*	*qr.*
Answ.	The *Officers* —	144	4	7	$1\frac{224}{410}$	each Man		24	0	9	0+
	Midshipmen —	108	3	5	$2\frac{6+}{110}$			9	0	3	1+
	Sailors — — —	57	11	11	$0\frac{123}{410}$			0	11	3	3+

60. If 1000 *lb.* of Beef serve 240 Men 8 Days, how many *lb* will serve 460 Men 10 Weeks? *Answ.* 16770 *lb* 13 *oz.* $\frac{640}{7920}$.

61. What is the Amount of 1000 *l.* for 5 Years and an Half, at $4\frac{1}{2}$ *per Cent.* simple Interest? *Answ.* 1261 *l* 5 *s.*

62. Sold Goods, amounting to the Value of 700 *l.* for two 4 Months; what is the present Worth, at 5 *per Cent.* simple Interest? *Answ.* 682 *l.* 19 *s.* 5 *d.* 2 *qrs.*

63. A Merchant bought 400 Cloths, at 12 *l. per* Cloth, which he shipped for *Spain,* to have Returns from thence, the one half in Wine, at 30 *l. per* Tun, and the other half in Rice, at 28 *s. per* C. *wt.* I demand how much of each must be returned for the Cloths? *Answ.* 80 *Tuns of Wine*; and 1714 C 1 *qr.* 4 *lb of Rice.*

64. A Tobacconist hath several Sorts of Tobacco; *viz.* of 12 *d. per lb.* of 16 *d. per lb* of 18 *d. per lb.* and of 2 *s. per lb.* and he is desirous to make a Mixture of an C. *wt.* worth 20 *d. per lb.* I demand how much of each Sort must be taken?

	lb.	*oz.*		*d. per lb.*
Answ.	17	$3\frac{18}{26}$	*at*	12
	17	$3\frac{18}{26}$	*at*	16
	17	$3\frac{8}{26}$	*at*	18
	60	$4\frac{24}{30}$	*at*	24

65. A Brewer mixed 17 Gallons of Ale, at 8 *d. per* Gallon, with 19 Gallons at 10 *d. per* Gallon, and with 40 Gallons at 6 *d. per* Gallon, I demand what 1 Gallon of this Mixture is worth; and also the Worth of the whole Quantity?

Answ. { 0 *l.* 0 *s.* 7 *d.* 1 *qr.* $\frac{60}{76}$ *per Gallon.*
{ 2 *l.* 7 *s.* 2 *d.* the Price of the whole Mixture.

66. There are two Numbers, the one 48, the other twice as much: I demand the Difference between their Sum and Difference? *Answ.* 96.

67. There

67. There are two Numbers, the one 63, the other half as much; I demand the Product of their Squares, and the Difference of their Product and Sum?

Answ. $\begin{cases} Product\ of\ the\ Squares\ 3938240.25 \\ Difference - - - - - \ 1890. \end{cases}$

68. There are two Numbers, the one 25, the other the Square of 25; I demand the Square-Root of the Sum of their Squares? *Answ.* 625.4998+

69. There are two Numbers, whose Product is 1058, and Multiplicand 46; I demand the Multiplier; the Sum of their Factors, and the Difference between the Sum of the Cubes of the Factors, and the Square of the Product?

Answ. $\begin{cases} Multiplier\ - - - 23. \\ Sum\ of\ the\ Factors\ 69. \\ Difference - 1009861. \end{cases}$

70. There are two Numbers whose Dividend is 1216, and the Quotient 76; I demand the Divisor; the Difference between the Cube of the Quotient, and the Sum of the Squares of the Divisor and Dividend; and the Cube-Root of the Sum of the Cubes of the Divisor, Dividend and Quotient?

Answ. $\begin{cases} Divisor - - - - 16. \\ Difference\ \ 1039936. \\ Cube\text{-}Root - - 1216. \end{cases}$

71. Two Men set out at the same time from the same Place, but go contrary Ways; and they travel each of them 34 Miles a Day: I demand the Time in which they will have travelled 2000 Miles? *Answ.* 29 *Days,* 9 *Hours,* 52 *Min.* $\frac{6}{68}$.

72 Six Rogues, *viz.* A, B, C, D, E, and F, having entered into a Confederacy, do agree to divide whatever Sums of Mony they shall at any time take upon the Highways, according to their Valour, that is in Proportion to the Number of Scars they should then have on their Faces: Now the first two *viz.* A, and B, being very bold and daring Fellows, had received A 20, and B 19 Scars: The next two, *viz.* C, and D, having a less Share of Courage, and not caring to stand all Brunts, had each of them but 9 Scars; but the other two, *viz.* E, and F, being mere Cowards, always turned their Backs at the least Opposition, and so by Chance they had one a-piece; and they having, at several times, stolen the Sum of 700 *l.* 13 *s.* do desire to know how they must divide it?

I 4

Answ.

		l.	*s.*	*d.*	*qrs.*
A	*muſt have*	237	10	2	$0\frac{8}{39}$.
B	– – – –	225	12	7	$3\frac{11}{39}$.
C	– – – –	106	17	6	$3\frac{19}{39}$.
D	– – – –	106	17	6	$3\frac{19}{39}$.
E	– – – –	11	17	6	$0\frac{24}{39}$.
F	– – – –	11	17	6	$0\frac{24}{39}$.

Anſw.

73. There are three Numbers, 17, 19 and 48; I demand the Difference between the Sum of the Squares of the firſt and laſt, and the Cube of the Middlemoſt? *Anſw.* 4266.

74. In 7 Cheeſes, each weighing 1 *C.* 2 *qrs.* 5 *lb.* how many Allowances for Sea-Men may be cut, each weighing 5 *oz.* 7 *dr.*? *Anſw.* 3563 $\frac{3}{8}\frac{5}{7}$ *Allowances.*

75. In 81034 Rundlets of Brandy, each 18 Gallons, how many Groſs of Bottles, each $\frac{8}{9}$ of a Quart? *Anſw.* 45581 *groſs,* 7 *doz.* 6 *Bottles.*

76. In 731 *doz.* Bottles of Wine, each 1 $\frac{5}{7}$ Pint, how many Hhds.? *Anſw.* 29 *hhds.* 52 *ga's.* 5 *pts.* $\frac{5}{7}$.

77. Sold 8 *C.* $\frac{1}{2}$ of Steel, at 12 *d. per lb.* how much *Flemiſh* Mony, at 33 *s.* 8 *d. per* Pound Sterling, am I to receive for the ſame? *Anſw.* 80 *l.* 2 *s.* 6 *d.* $\frac{96}{240}$ *Flemiſh.*

78. If 48 taken from 120 leave 72, and 72 taken from 91 leave 19, and 7 taken from thence leave 12; what Number is that, out of which, when you have taken 48, 72, 19, and 7 leaves 12? *Anſw.* 158.

79. *A* hath $\frac{1}{2}$ of a Ship, *B* $\frac{1}{4}$, *C* $\frac{1}{16}$, *D* $\frac{3}{16}$; the Maſter clears 120 *l.* how much muſt each Owner have?

		l.	*s.*
A	*muſt have*	60	0
B	– – – –	30	0
C	– – – –	7	10
D	– – – –	22	10

Anſw.

80. A Gentleman having 50 *s.* to pay among his Labourers for a Day's Work, would give to every Boy 6 *d.* to every Woman 8 *d.* and to every Man 16 *d.* the Number of Boys, Women and Men, was the ſame; I demand the Number of each? *Anſw.* 20 *of each ſort.*

81. A Gentleman had 7 *l.* 17 *s.* 6 *d.* to pay among his Labourers; to every Boy he gave 6 *d.* to every Woman 8 *d.* and to every Man 16 *d.* and there were for every Boy three Women, and for every Woman two Men; I demand the Number of each? *Anſw.* 15 *Boy's*, 45 *Women*, 90 *Men.*

82. Admit

82. Admit a Tax of 39 *l.* is laid on a Town for the building of a Bridge, and the Value of the Town-Rent is 9ɔo *l. per Ann.* what ſhall a Man pay towards it, whoſe Income is worth 100 *l. per Ann.? Anſw.* 4 *l.* 6 *s.* 8 *d.*

83. Suppoſe *A* hath an Eſtate of 53 *l. per Ann.* and pays 5 *s.* 10 *d* to a Subſidy; what ſhall *B* pay, whoſe Eſtate is worth 100 *l. per Ann.? Anſw.* 11 *s.* 0 *d.*$\frac{4}{53}$.

84. If 136 *l.* are to be divided between two Men, ſo as the leſſer Share may have ſuch Proportion to the greater as 2 to 5, what muſt each Man have ?

	l.	*s.*	*d.*	*qrs.*
One muſt have	38	17	1	2$\frac{6}{7}$
The other	97	2	10	1$\frac{1}{7}$

Anſw.

85. There are 1000 *l.* to be divided among 3 Men, in ſuch Manner that if *A* have 3 *l. B* ſhall have 5 *l.* and *C* 8 *l.* how much muſt each Man have?

	l.	*s.*
A muſt have	187	10
B	312	10
C	500	0

Anſw.

86. Ship'd for *Jamaica* 550 Pair of Stockings, at 11 *s.* 6 *d. per* Pair, and 460 Yards of Stuff, at 14 *d. per* Yard; in return for which, I had 46 *C.* 3 *qrs.* of Sugar, at 24 *s.* 6 *d. per C.* and 1570 *lb.* of Indigo, at 2 *s.* 4 *d. per lb.* what remains due to me of my Adventure? *Anſw.* 102 *l.* 12 *s.* 11 *d.* 2 *qrs.*

87. If one Pound ten, and forty Groats
    Will buy a Load of Hay;
How many Pounds with nineteen Crowns
    For twenty Loads will pay? *Anſw.* 38 *l.* 11 *s.* 8 *d.*

88. A Man driving his Geeſe to the Market, was met by another, who ſaid Good-morrow Maſter with your Hundred Geeſe. Says he, I have not an Hundred; but if I had half as many as I now have, and two Geeſe and an half, beſide the Number I have already, I ſhould have an Hundred: How many had he? *Anſw.* 65.

89. If a Tower be 384 Feet high from the Foundation, and a ſixth Part be under the Earth, and an eighth Part under the Water; how much in height is viſible? *Anſw.* 272 *Feet.*

90. A Merchant would lay out in Spices 560 *l.* at the following Prices, *viz.* Cloves at 4 *s. per lb.* Mace at 7 *s.* Cinnamon at 3 *s.* Nutmegs at 12 *s.* and Pepper at 2 *s. per lb.* and he would have an equal Quantity of each Sort; I demand that Quantity? *Anſw.* 400 *lb. of each Sort.*

I 5

91. The

91. The computed Diftance between *London* and *York* is 150 Miles; now if a Man fets out from *London*, and walks every Day towards *York* 20 Miles, and back again towards *London* 15 Miles; how long will it be before he gets to his Journey's End? *Anfw.* 30 *Days.*

92. Bought 127 Pieces of Cloth, for which I delivered 3589 Ells of Holland, at 7 *s.* 11 *d. per* Ell Englifh; what coft a Piece of that Cloth? *Anfw.* 11 *l.* 3 *s.* 8 *d.* 2 *qrs.* $\frac{9}{127}$.

93. The Account of a certain School is as followeth; *viz.* $\frac{1}{13}$ of the Boys learn Geometry, $\frac{3}{4}$ learn Grammar, $\frac{3}{10}$ learn Arithmetic, $\frac{3}{20}$ learn to write, and 9 learn to read; I demand the Number of each? *Anfw.* 5 *Geometers,* 30 *Grammarians,* 24 *Arithmeticians,* 12 *Writers, and* 9 *Readers.*

94. I have laid out for a Merchant 638 *l.* 17 *s.* 3 *d.* he allows me 2¾ *per Cent.* before that I owed him 184 *l.* 17 *s.* 9 *d.* how much is he indebted to me? *Anfw.* 471 *l.* 10 *s.* 10 *d.* 1 *qr.*

95. Bought a Tun of Wine for 78 *l.* 17 *s.* at what Price muft I fell it *per* Quart to gain 5 *l.* 10 *s.* by the Whole, when there were 22 Gallons leaked out? *Anfw.* 22 *d.*+

96. If out of 10 *s. per* Week I lay up 4 *d.* 2 *qrs. per* Day, *Sundays* excepted; and have faved 9 *l.* 2 *s.* 3 *d.* how long was I in laying it up; and how much have I fpent in that Time?

Anfw. { 567 *Days in laying up*
{ 31 *l.* 7 *s.* 9 *d. fpent*

97. If I buy 1000 Ells *Flemifh* of Linen for 90 *l.* what may I fell it *per* Ell in *London* to gain 10 *l.* by the Whole? *Anfw.* 3 *s.* 4 *d. per Ell.*

98. Bought threefcore Pieces of Holland for three times as many Pounds, and fold them again for four times as much; but if they had coft me as much as I fold them for, what fhould I have fold them for, to gain after the fame Rate? *Anfw.* 320 *l.*

99. There are three Quantities of Silver, each of the fame Weight, but different in Value; the Weight of each Quantity is 10 *oz.* the Value of the firft Sort is 4 *s. per oz.* of the fecond 4 *s.* 6 *d. per oz.* and of the third 5 *s. per oz.* I demand the Worth of an Oz. when they are all melted down together? *Anfw.* 4 *s.* 6 *d. per oz.*

100. I have received advice from my Factor, that he has disbursed upon my Account, the Sum of 4000 Guilders, 15 Stivers; I demand what Sum I muft anfwer for that in *Englifh* Mony, Exchange at Par; and alfo what his Commiffion comes to at 2 *per Aent.*

Anfw. { 400 *l.* 1 *s.* 6 *d. Sterling.*
{ 8 *l.* 0 *s.* 0 *d.* 1 *qr. Commiffion.*

101. A

101. A Merchant bought a Parcel of Jewels for 220*l.* and fold them again for 440*l.* payable at the End of 6 Months; I demand what the Gain was worth in ready Mony; Rebate being made at 6 *per Cent* ? *Anfw.* 213*l.* 11*s.* 10*d.*+

102. A Factor bought 4 Chefts of Sugar, the Mark and Weight as follows;

	C.	qrs.	lb.
A – – – –	10	3	14
B – – – –	12	1	17
C – – – –	13	1	19
D – – – –	11	2	10

now fuppofe the Tare or Weight of every Cheft, when it is empty, to be 38 *lb.* I demand the neat Weight of the faid Sugar; alfo I demand the Prime Coft of the fame, fuppofing it came to 18*s.* *per C.* including the Charges of Lighterage, Porterage, Warehoufe-Room, Cuftom, &c. alfo I demand the whole Gain, and the Gain *per Cent.* fuppofing the Chefts *A* and *B* were fold afterwards at 28 *s. per C.* and the other two Chefts, *viz.* *C* and *D*, at 4 *per lb.*

	l.	s	d.
Anfw. { *Prime Coft* – – – –	42	4	8½
Whole Gain – – – –	34	16	4½
Gain per Cent. – – –	82	8	9½

103. A Gentleman a Chaife did buy,
  An Horfe and Harnefs too;
They coft the Sum of threefcore Pounds,
  Upon my Word 'tis true;
The Harnefs came to half of th'Horfe,
  The Horfe twice of the Chaife;
And if you find the Price of them,
  Take them and go your Ways.

Anfw. { *Chaife* – – – – – –	15*l.*
Horfe – – – – – –	30
Harnefs – – – – –	15

104. A Gentleman courted a young Lady; and as their Birth-Days happened together, they agreed to make that their Wedding-Day. On the Day of Marriage, it happen'd, that the Gentleman's Age was juft double to that of the Lady's, that is as 2 to 1. After they had lived together 30 Years, the Gentleman obferved that his Lady's Age drew nearer to his, and that his was only in fuch Proportion to hers as 2 to 1⅓, Thirty Years after this the fame Gentleman found his and his Lady's Ages to be as near as 2 to 1 ⅓; at which Time they both died. I demand their feveral Ages at the Day of their Marriage, and of their Death; Alfo the Reafon why the Lady's Age, which was continually gaining upon her Hufband's, fhould, notwithftanding, be never able to overtake it.

A *short Collection of Pleasant and Diverting* QUESTIONS.

1. A General having a Castle, situate on a Square, and garrison'd by 48 Soldiers, so order'd them, as that any two Corners and the Side between them, should consist of 18 Men; but he thinking there were not Men enow, hired 8 more, but still kept up the same Number of 18 Men as before; afterwards 16 Men were paid off, he not having Occasion for them; but yet he kept up his Number of 18 Men; I demand how he must place the said Men, to make 18 every Way, when he had 48, 56, and 40 Soldiers?

2. A poor Woman carrying some Eggs to Market, met with a rude Fellow, who broke them all; but presently after, considering what he had done, went back and told the Woman he was willing to make Satisfaction, provided she could tell how many there were; she answered, she could not tell, but the best Account that she could give, was, that when she told them in by two at a Time, there was one left, when by three, there was one left, and when by four, there was one left, but when she told them in by five, there was none left: I demand how many Eggs the Woman had?

3. A Gentleman's Servant went to Market with an Order to by 20 Fowls for 20 *d.* he did so; and brought home Pigeons at 4 *d.* a-piece, Larks at a Halfpenny a-piece, and Sparrows at a Farthing a-piece: I demand how many there were of each sort?

4. Suppose the 9 Digits to be placed in a quadrangular Form; I demand in what Order they must stand, that any three Figures in a right Line may make just 15?

5. Let 12 be set down in four Figures, and let each Figure be the same.

6. A Countryman having a Fox, a Goose, and a Peck of Corn, in his Journey came to a River, where it so happened that he could carry but one over at a Time. Now, as no two were to be left together that might destroy each other; So he was at his Wits end how to dispose of them: For, says he, 'Tho' the Corn can't eat the Goose, nor the Goose eat the Fox, yet the Fox can eat the Goose, and the Goose eat the Corn. The Question is, how he must carry them over that they might not devour each other?

7. Three jealous Husbands with their Wives, being ready to pass by Night over a River, do find at the Water-side a Boat which can carry but two Persons at once, and for want of a Waterman, they are necessitated to row themselves over the River at several Times: The Question is, how these 6 Persons shall pass by 2 and 2, so that none of the three Wives may be found in the Company of 1 or 2 Men unless her Husband be present? *Wingate.*

8. Two merry Companions are to have equal Shares of 8 Gallons of Wine, which are in a Vessel containing exactly 8 Gallons: Now to divide it equally between them, they have only two other empty Vessels, of which one contains 5 Gallons, and the other 3; the Question is, how they shall divide the said Wine between them by the Help of these 3 Vessels, so that they may have 4 Gallons a-piece? *Wingate.*

9. Says *Jack* to his Brother *Harry*, I can place four threes in such manner that they shall make just 34; can you do so too?

THE

PART V.

Of DUODECIMALS.

Q. *W*HAT are Duodecimals?
A. They are Fractions of a *Foot*, or of an *Inch*, or any Part of an *Inch*, having 12 for their Denominators.

NOTATION *of* DUODECIMALS.

Q. *H*OW do you *write* Duodecimals?

F. I. $''$ $'''$ $''''$

A. Thus: 3 7 2 3 7, &c.

Q. *How do you read them?*

A. Thus: 3 *Feet*, 7 *Inches*, 2 *Seconds*, 3 *Thirds*, 7 *Fourths*, &c.

Note 1, *Some call the Indices Primes, and mark them thus* 7.

2. *Though this manner of dividing and subdividing a Foot is endless, yet it is so only in Imagination, and cannot be reduced to Practice, because a Second, or a twelfth Part of an Inch is so small, as to be incapable of any further Division.*

ADDITION *of* DUODECIMALS.

Note, 12 *Fourths* make 1 *Third*.
12 *Thirds* — 1 *Second.*
12 *Seconds* — 1 *Inch.*
12 *Inches* — 1 *Foot.*

EXAMPLES.

F.	I.	$''$	$'''$	$''''$
14	4	3	5	6
17	10	11	10	4
16	3	7	5	8
19	1	10	11	11
19	3	5	7	11
46	4	9	10	6

F.	I.	$''$	$'''$	$''''$
28	4	3	7	10
36	10	3	11	5
19	10	4	7	6
39	5	6	9	4
47	6	2	10	11
92	11	10	3	7

A Joiner

A Joiner having finifhed feveral very curious Pieces of Workmanfhip, would know the Content of the Whole : Now the firft Piece meafured feventeen Feet, ten Inches, two Seconds, and 1 Third ; the fecond meafured twenty Feet, four Inches, and feven thirds , the third forty-nine Feet, fix Inches, and nine Seconds ; the fourth fourfcore Feet, and ten Seconds ; the fifth feventeen Feet and four Thirds ; the fixth threefcore Feet, and ten Seconds ; and the feventh thirty-feven Feet, and nine Thirds ; What was the Content in Square Meafure ?

SUBTRACTION *of* DUODECIMALS.

EXAMPLES.

	F.	I.	$''$.	$'''$.	$''''$.		F.	I.	$''$.	$'''$.	$''''$.
From	74	3	4	7	6		100	5	7	3	1
Take	19	4	8	8	10		97	8	9	10	11

A Joiner having lined feveral Rooms, very curioufly, with Cedar, finds the Amount to be, in Square Meafure, 8co f. 3 i. 4 $''$. but feveral Deductions being to be made for Windows, Arches, &c. thofe Deductions amounted to 70 f. 3 i. 7 $''$. 10 $'''$. 5 $''''$. how many Feet of Workmanfhip muft he be paid for ?

MULTIPLICATION *of* DUODECIMALS,

commonly called CROSS MULTIPLICATION.

Note, Feet multiplied by Feet give Feet.
        Feet multiplied by Inches give Inches.
        Feet multiplied by Seconds give Seconds.
        Inches multiplied by Inches give Seconds.
        Inches multiplied by Seconds give Thirds.
        Seconds multiplied by Seconds give Fourths, &c.

EXAM-

EXAMPLES. 1. Of Feet and Inches.

	F.	I.
Multiply	7	3
By	4	7

	29	0	"
	4	2	9

Product	33	2	9

1. Here I multiply the 7 *f.* 3 *in.* firſt by 4 Feet (which gives Feet and Inches for the Product) ſaying 4 times 3 is 12, ſet down 0 and carry 1 ; then 4 times 7 is 28 and 1 is 29, which ſet down.

2. Next I multiply the ſame 7 *f.* 3 *in.* by 7 Inches (which give Inches and Seconds for the Product) ſaying 7 times 3 is 21, ſet down 9 Seconds and carry 1 Inch ; then 7 times 7 is 49 and 1 is 50 Inches, or 4 Feet, 2 Inches, which ſet down ; then add them together, and the whole is 33 *f.* 2 *in.* 9 *ſec.*

	F.	I.			F.	I.			F.	I.			F.	I.
Multiply	7	5			4	6			9	7			8	3
By	3	9			5	8			9	7			6	4
Product	27	9	9		25	6			91	10	1		52	3

	F.	I.			F.	I.			F.	I.	
Multiply	4	7			3	8			9	7	
By	5	10			7	6			3	6	
Product	26	8	10		27	6			32	6	6

	F.	I.			F.	I.			F.	I.	
Multiply	3	11			6	5			7	10	
By	9	5			7	6			8	11	
Product	36	10	7		48	1	6		69	10	2

The Truth of any one of theſe Operations, may be proved by reducing the Factors into Inches, and dividing their Product by 144 the Number of ſquare Inches in a Foot ſquare, the Quotient will be the Anſwer, *viz.*

First

First Sum.			2. By Vulgar Fractions.	3. By Decimals.

1. By whole Numbers.

F.	I.	I.
7	3 =	87
4	7 =	55

$$\overline{}$$

$$435$$
$$435$$

$$\overline{}$$

144)4785(33
432

$$\overline{}$$

465
432

$$\overline{}$$

33
12

$$\overline{}$$

144)396(2
288

$$\overline{}$$

108
12

$$\overline{}$$

144)1296(9
1296

$$\overline{}$$

o

2. By Vulgar Fractions.

Multiply $7\frac{3}{12}$
By $4\frac{7}{12}$

$$\frac{87}{12} \times \frac{55}{12} = \frac{4785}{144}$$

Then divide the Numerator by the Denominator, as before.

3. By Decimals.

Mult. 4.5833+
By   7.25

$$\overline{}$$

229165
91666
320831

$$\overline{}$$

33.228925
12

$$\overline{}$$

2.747100
12

$$\overline{}$$

8.9652

	F.	I.	''.
Facit	33	2	9 *nearly*.

Note, *When the Number of Feet happens to be large in either or both of the Factors, instead of multiplying by Inches (if any be) you may take Parts with them.*

EXAMPLES.

	F.	I.			F.	I.		F.	I.
Multiply	76	7			46	7		71	7
By	48	9			39	8		84	6

76 × 8 =	608			1847	9	8	6048	9	6
76 × 4 =	304				F.	I.		F.	I.
48 × 7 =	28		'''.						
6½	38	3	6	76	7		36	1	
3½	19	1	9	19	10		18	8	

Product	3733	5	3	1518	10	10	673	6	8

	F.	I.			F.	I.			F.	I.	
Multiply	84	3			48	7			79	8	
By	95	2			26	8			38	11	
Product	8017	9	6		1295	9	8		3100	4	4

	F.	I.			F.	I.			F.	I.	
Multiply	127	6			767	5			7691	10	
By	184	8			198	3			1976	11	
Product	23545	0		152140	4	3		15206113	6	2	

2. Of Feet, Inches, and Seconds.

	F.	I.	″.			F.	I.	″.		F.	I.	″.
Multiply	7	3	2			8	6	9		3	10	6
By	1	7	3			7	3	8		7	4	8
	7	3	2			62	6	7	9	28	7	7
	4	2	10	2								
		1	9	9	6							
Product	11	7	9	11	6							

F.	I.	″.			F.	I.	″.			F.	I.	″.		
7	1	9			3	8	4			9	8	7		
7	8	9			3	9	2			12	3	10		
55	2	9	3	9	13	10	10	4	8	119	8	2	10	10

F.	I.	″.			F.	I.	″.			F.	I.	″.		
9	8	7			3	2	1			5	6	7		
6	5	4			2	3	4			8	9	10		
62	7	3	9	4	7	2	8	11	4	48	11	2	8	10

Note, If the Number of Feet is large, instead of multiplying by Inches and Seconds, you may take Parts with them.

E x a m-

EXAMPLES.

I.
6½)

	F.	I.	".
76	3	9	
84	7	11	

76 × 4 =	304	0	0		
76 × 8 = 608	0	0			
3 × 84 =	21	0	0		
9 × 84 =	5	3	0	'''	
I.1½)	38	1	10	6	
"6½)	6	4	3	9	''''
3¼)	3	2	1	10	6
2⅓)	1	7	0	11	3
	1	0	8	7	6
	6460	7	1	8	3

	F.	I.	".	
87	3	4		
18	1	7		
1582	6	2	3	

	F.	I.	".	
64	3	7		
27	2	6		
1749	5	5	11	6

	F.	I.	".	
49	3	1		
48	1	2		
2369	1	5	7	2

F.	I.	".		
71	3	6		
92	1	7		
6568	2	10	6	11

F.	I.	".	
71	2	6	
81	1	8	
5777	9	2	2

F.	I.	".	
56	1	8	
97	3	9	
5463	0	2	3

F.	I.	".	
756	1	8	
184	2	6	
139287	1	0	2

F.	I.	".		
371	2	6		
181	1	9		
67242	10	1	4	6

F.	I.	".		
487	11	10		
186	10	11		
91209	4	2	2	2

A Decimal

A Decimal Table of Inches and Seconds.

I.	S.	Decimals	I.	S.	Decimals	I.	S.	Decimal	I.	S.	Decimals
	1	.006944	1	1	.090277	2	1	.173611	3	1	.256944
	2	.013888		2	.097222		2	.180555		2	.263888
	3	.020833		3	.104166		3	.1875		3	.270833
	4	.027777		4	.111111		4	.194444		4	.277777
	5	.034722		5	.118055		5	.201388		5	.284722
	6	.041666		6	.125		6	.208333		6	.291666
	7	.048611		7	.131944		7	.215277		7	.298611
	8	.055555		8	.138888		8	.222222		8	.305555
	9	.0625		9	.145833		9	.229166		9	.3125
	10	.069444		10	.152777		10	.236111		10	.319444
	11	.076388		11	.159722		11	.243055		11	.326388
1	0	.083333	2	0	.166666	3	0	.25	4	0	.333333

I.	S.	Decimals	I.	S.	Decimals	I.	S.	Decimals	I.	S.	Decimals
4	1	.340277	5	1	.423611	6	1	.506944	7	1	.590277
	2	.347222		2	.430555		2	.513888		2	.597222
	3	.354166		3	.43765		3	.520833		3	.604166
	4	.361111		4	.444444		4	.527777		4	.611111
	5	.368055		5	.451388		5	.534722		5	.618055
	6	.375		6	.458333		6	.541666		6	.624999
	7	.381944		7	.465277		7	.548611		7	.631944
	8	.388888		8	.472222		8	.555555		8	.638888
	9	.395833		9	.479166		9	.5625		9	.645833
	10	.402777		10	.486111		10	.569444		10	.652777
	11	.409722		11	.493055		11	.576388		11	.659722
5	0	.416666	6	0	.5	7	0	.583333	8	0	.666666

I.	S.	Decimals	I.	S.	Decimals	I.	S.	Decimal	I.	S.	Decimals
8	1	.673611	9	1	.756944	10	1	.840277	11	1	.923611
	2	.680555		2	.763888		2	.847222		2	.930555
	3	.6875		3	.770833		3	.854166		3	.9375
	4	.694444		4	.777777		4	.861111		4	.944444
	5	.701388		5	.784722		5	.868055		5	.951388
	6	.708333		6	.791666		6	.874999		6	.958333
	7	.715277		7	.798611		7	.881944		7	.965277
	8	.722222		8	.805555		8	.888888		8	.972222
	9	.729166		9	.8125		9	.895833		9	.979166
	10	.736111		10	.819444		10	.902777		10	.986111
	11	.743055		11	.826388		11	.909722		11	.993055
9	0	.75	10	0	.833333	11	0	.916666	12	0	1.

The Conftruction of the foregoing T A B L E.

Let it be required to find what Part of a Foot one Second is in Decimals.

1. One Foot reduced into Seconds, makes 144 Seconds.
2. The Vulgar Fraction will then be $\frac{1}{144}$ of a Foot.
3. Divide the upper Term by the lower, and the Quotient thence arifing will be the Anfwer.

$$144) 1.000000 (.006944 +$$
$$864$$
$$\overline{1360}$$
$$1296$$
$$\overline{640}$$
$$576$$
$$\overline{640}$$
$$576$$
$$\overline{64}$$

After the fame Manner the whole Table is made, except in the Cafe of Inches only; as in the Cafe of one Inch, where the Vulgar Fraction will be $\frac{1}{12}$ of a Foot. Divide the upper Term by the lower, as before, and you have the Quotient for the Anfwer.

$$12) 1.000000 (.083333 +$$
$$4$$

Note 1, *If the given Part of a* Foot *confift only of* Inches, *the Divifor need be no more than* 12, *becaufe* 12 *Inches make* 1 *Foot.*
2. *If the given Part of a* Foot *confift of* Seconds *only, or* Inches *and* Seconds *together, then* 144 *muft be the Divifor, becaufe* 144 *Seconds make* 1 *Foot.*

The Ufe of the foregoing TABLE.

Let the firft Example in Multiplication be given, *viz.*

F. I.
Multiply 7 3
By 4 7

Look, in the Table for 3 Inches, againft which ftands .25 — Again, look for 7 Inches, againft which ftands .583333 — Hence it follows, that 7 *f*. 3 *i*. = 7.25 *f*. and 4 *f*. 7 *in*. = 4.583333 *f*.

Note, *It is common, in any large Number of* Decimals, *to fave Trouble in the Operation, by making one of them one Part larger, which cuts off all the following Figures ; thus* 4.58333 *f*. *may be made* 4.584 *f*.

F.
Multiply 7.25
By 4.584
———————
2900
5800
3625
2900
———— ——
33.23400
12
————
2.808
12
————
9.696
————
F. I. *''*.
Anfw. 33 2 9

Again ; let the firft Example in Feet, Inches and Seconds be given, *viz.*

F. I. *''*.
Multiply 7 3 2
By 1 7 3

Look, in the Table for 3 *i* 2 *f*. and againft them you will find .263888 ; alfo look, in the fame Table, for 7 *i*. 3 *f*. and againft them you will find .604166 : Then, by fhortening the Decimals

Multiply

Multiply 7.264
By   1.6041
─────────────

          7264
        29056
      43584
      7264
─────────────

      11.6521824
             12
─────────────

        7.82616
             12
─────────────

        9.91392

      10.96704
             12
─────────────

      11.60448

F. I. ''. '''. ''''.
Anfw. 11   7   9   10   11 *the Difference being inconfiderable.*

DIVISION *of* DUODECIMALS.

F.	I.	"	F.	I.	"		F.	I.	"		
2)146	7	10(73	3	11		11)123	4	5(			
3)761	4	11(				12) 76	8	7(	'''	'''''	
4)963	2	10(				7) 86	3	7	4	8(	
5)186	1	10(				8) 98	4	6	9	1(	
6) 76	3	11(				9) 86	2	1	1	7(	
7)186	1	10(				10) 47	3	4	6	1(	
8)712	8	4(				11) 96	2	7	11	4(	
9)812	3	5(				12) 83	1	6	9	10(	
10)861	11	10(				12) 78	10	11	10	9(	

Note 1, It *very feldom happens that the* Divifor *confifts of more than one Denomination: Yet becaufe fuch Divifors may fometimes offer themfelves, I will give a few for the Reader's Satisfaction, which muft be wrought after the manner of* Long Divifion, *and may ferve alfo as Proofs to fome of the foregoing Examples in* Multiplication.

2. *This fort of Divifion often admits of two Figures at once in the* Quotient.

E X A M-

EXAMPLES.

```
          F.  I. F.  I.  ''. F. I.
          4  5)33  1  6(7  6
   4   5 × 7 = 30 11
                ————————
                 2  2  6
   4   5 × 6 =   2  2  6
                ————————
                       0
```

Note, *If the* Feet *in the* Quotient *consist of more than one Figure, you must consider*

1. *How many Figures are required in the* Feet *by common Division.*

2. *If the* Feet *required consist only of two Figures, you must multiply the* Divisor *by the first Figure (which stands in tens Place) with a Cypher annexed. But*

3. *If the* Feet *required consist of three Figures, you must multiply the* Divisor *by the first Figure (which stands in Hundreds Place) with two Cyphers annexed; and the next Figure in the* Quotient *(which stands in tens Place) with one Cypher annexed.*

4. *Whatever the Product is in Feet and* Inches, *let it be placed under the* Dividend, *in such manner, that Feet and Inches may stand under Feet and Inches, and Units under Units.*

5. *With regard to the Number of* Feet *in the Dividend, you must proceed according to the common Method of* Long Division, *'till you have obtain'd the Number of Feet required in the* Quotient.

```
             F.   I.  F.    I.  ''. F.   I.
             184  8) 235.45  0   0(127   6
    184   8 × 100 = 184.66   8
                    ——————————
                    507.8    4
    184   8 × 20 =  369.3    4
                    ——————————
                    1385     0
    184   8 × 7  =  1292     8
                    ——————————
                     92   4  0
    184   8 × 6 Inches = 92 4  0
                        ————————
                               0
```

```
             F.   I. F.    I.  ''. F.   I.
             48   9) 3733   5   3(76    7
    48   9 × 70 = 3412      6
                  ——————————
                  320  11
    48   9 × 6  = 290   6
                  ——————————
                  28   5   3
    48   9 × 7 In. = 28  5  3
                     —————————
                             0
```

F. I. F.   I. ''. F. I.
79 8)3100 4 4(38 11
79 8×30 = 2390

710 4
79 8×8 = 637 4

73 0 4
79 8×11 *In.* = 73 0 4

0

F.	I.	F.	I.	''.		F.	I.	F.	I.	''.
6	7)	31	3	3(		39	8)1847	9	8	
8	10)	87	7	2(		84	6)6048	9	6	
8	9)	83	10	3(		19	10)1518	10	10(	
12	9)130	8	3(			95	2)8017	9	6(	
11	5)140	9	8(			26	8)1895	6	8(	
9	3)116	4	9(			18	8) 673	6	8(	

F. I. ''. F. I. ''. ''. ''''. F. I. ''.
1 7 3)11 7 9 11 6(7 3 2
11 2 9

5 0 11
4 9 9

3 2 6
3 2 6

0

F. I. ''. F. I. ''. '''. ''''.   F. I. ''. F. I. ''. '''. ''''.
7 3 8)62 6 7 9(12 3 10)119 8 2 10 10(
3 10 6)28 7 7 0(9 8 7) 62 7 3 9 4(
7 1 9)55 2 9 3 9(3 2 1) 7 2 8 11 4(
3 9 2)13 10 10 4 8(8 9 10) 48 11 2 8 10(

F I N I S.